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ABSTRACT

This resource guide provides teachers of grades 4-6 with ideas and materials to integrate agricultural concepts into classroom activities. The guide is organized into six categories: math, science, language arts, social studies, fine arts, and health/nutrition/safety. Each category contains 10 lessons organized in the following topic order: agribusiness, production agriculture, product technology, food processing, environmental science, horticulture, agriculture mechanics, agriculture economics, agriculture careers, and Illinois agriculture and general agriculture. Each lesson has been correlated with the Illinois learning standards, and a chart lists individual lessons and related standards. Each lesson also includes background information that may be used by the teacher in preparing a class presentation or discussion. Complete instructions for the lesson plan activities include a list of necessary materials, procedures, related activities, and discussion questions. Student activities can be increased or decreased as appropriate for age and grade level. Worksheet masters are included that can be used as homework, quizzes, or individual assignments. Final sections of the document outline careers in agriculture and list contact information for Illinois county farm bureaus. (Contains an index.) (TD)

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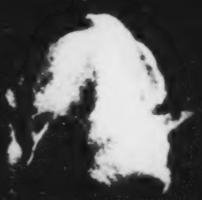
Kids, Crops, & Critters in the Classroom



Resource Guide for Teachers

an Ag in the Classroom Project

produced by Illinois Farm Bureau®
with funding provided by the IAA Foundation

Grades 4-6

RC 022 493

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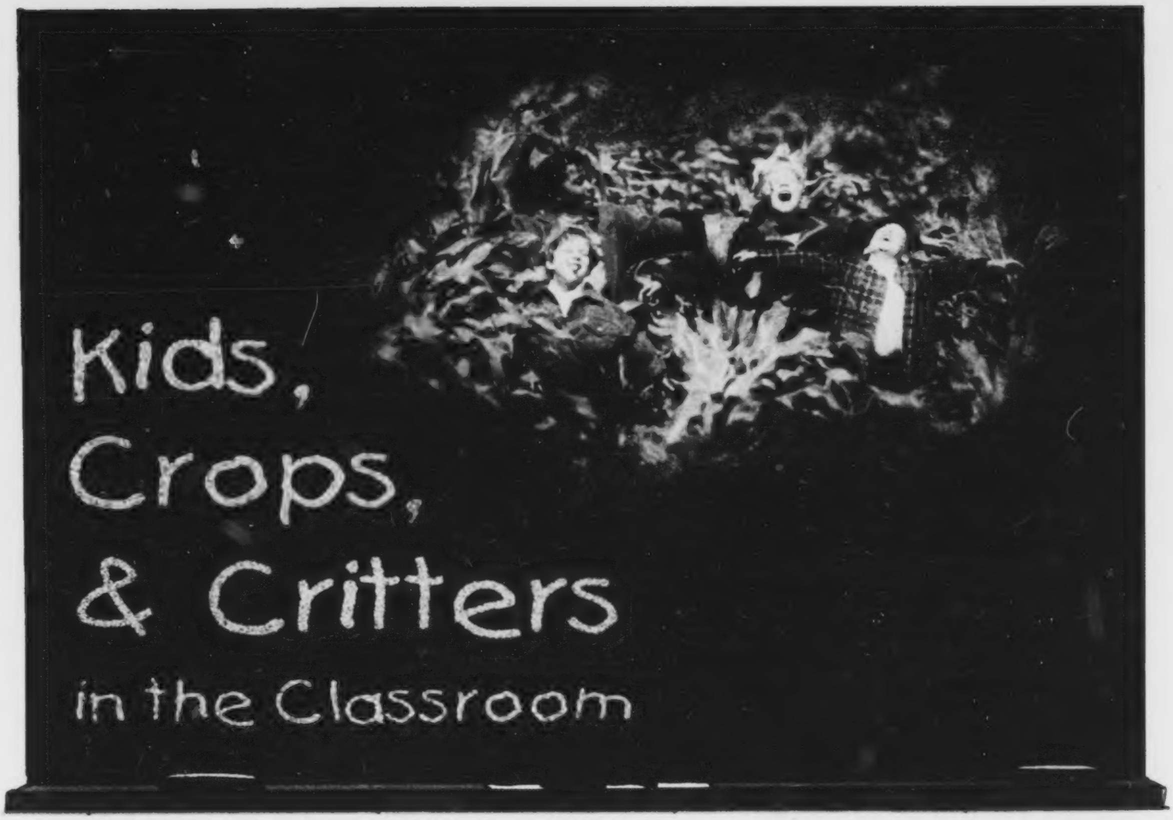
Kids,
Crops,
& Critters
in the Classroom

An Agricultural Literacy Resource Guide For Grades 4-6

Produced by the
Illinois Farm Bureau®
with funding provided by the
IAA Foundation

Illinois Farm Bureau Agriculture in the Classroom

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April 2000

Kids, Crops, & Critters in the Classroom

Resource Guide for Teachers

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A web site designed for teachers including:

- Marvelous Materials for your Classroom
- How to Find a Farmer to be a Guest Speaker for your Class
- How to Have Fun with Other Teachers and Receive Graduate Credit
- How to Partner with us for Ag Literacy
- A Free Sample of Ag in the Classroom Materials

A Tribute to Jerome P. Weiss

Jerome P. Weiss
IAA General Counsel
1977-1996

Family, associates, and friends of Jerome (Jerry) Weiss have made significant contributions to the IAA Foundation to publish this Ag in the Classroom Resource Guide as a tribute to his memory and service.

Mr. Weiss served the Illinois Agricultural Association as its General Counsel from 1977 to 1996.

He was truly dedicated to the IAA, its leaders, and the farmers of Illinois. In addition to his loyalty, he approached his tasks with intensity and tireless energy and provided superb counsel that will continue to serve the IAA and its affiliates well into the 21st century.

Two of Mr. Weiss' strongest professional traits were preparation and loyalty to agriculture and agribusiness. That is why this tribute is so fitting. The Ag in the Classroom Resource Guide will help teachers prepare to educate their students about the importance of agriculture and the business of food and fiber production.

He would be pleased with this guide and its purpose and grateful to those who contributed to make it possible.

Acknowledgments

The Illinois Farm Bureau® extends sincere appreciation to those who provided information, suggestions, and technical expertise during the development of *Kids, Crops, and Critters in the Classroom*:

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To The Teacher

Kids, Crops, and Critters in the Classroom adds fun and excitement to your classroom! It has been designed to provide you with ideas and materials which facilitate integration of agricultural concepts into your classroom activities and provide many hands-on activities to encourage learning. The content and format have both been designed for maximum flexibility. There are three volumes created for teachers; the K-3 guide for students at the primary level, the 4-6 guide for intermediate students, and the 7-8 guide for pre-secondary students.

The loose spiral binding allows for easier reproduction of handouts and worksheets. The guide is organized into six categories: Math, Science, Language Arts, Social Studies, Fine Arts, and Health/Nutrition/Safety. Each of these areas contain ten lessons. The ten lessons in each category are in this topic order:

Agribusiness:

The supply and sale of products and the provision of services needed for agriculture production. This applies to all aspects that help get the commodities produced and transported to market, including the supply of products that farmers need to produce commodities.

Production Agriculture:

The growing of crops or raising of livestock. Production agriculture also includes a series of acts or changes including manufacturing, conditioning, treating, preparing, and handling of agricultural products (food, fiber, forestry, and flowers).

Product Technology:

There is a great deal of research and development being done in which the results are being used in numerous areas to make improvements in the agricultural industry. Product inventions and improvements, better quality food, environmentally friendly production techniques, and many other developments have taken place.

Food Processing:

Deals with transporting, grading, and processing the food to help move it from production to market.

Environmental Science:

The branch of science concerned with physical, chemical, and biological conditions of the environment and their effect on organisms. Water quality and quantity, soil conservation, and agriculture chemical usage are all areas of environmental science.

Horticulture:

Horticulture deals with raising and caring for flowers, fruits, vegetables, and ornamental plants. People who work in the field of horticulture are involved in plant propagation and breeding, genetic engineering, plant physiology, biochemistry, and many other processes.

Agriculture Mechanics:

Ag mechanics involves understanding how farm machines work, using machines and systems such as electricity and water systems on farms, and the transporting of products with machinery.

Agriculture Economics:

Ag economics includes issues that deal with production, distribution, and consumption of wealth and commodities.

Agriculture Careers:

More than 48,000 employment opportunities are available annually in agriculture and there are only 43,500 qualified graduates to fill the positions. Career information includes job requirements, training, and demand.

Illinois Agriculture and General Agriculture:

Includes information about all aspects of agriculture specific to Illinois and other general agricultural information.

By combining various components from these sections, you will be able to create instructional units or just pick out fun and interesting lessons that support your present curriculum information. We have also included a list of additional resources of state and national organizations that can provide information and/or materials related to agriculture education.

The primary goal of the Ag in the Classroom project and *Kids, Crops, and Critters in the Classroom* is to increase awareness of agricultural topics among students at all levels.

4-6 Lessons		1.A.2a	1.B.2d	2.A.2a	3.A.2	3.B.2a	3.B.2b	3.B.2c	3.B.2d	3.C.2a	3.C.2b	4.A.2a	4.A.2b	4.B.2a	4.B.2b	4.B.2c	4.B.2d	5.A.2a	5.A.2b	5.B.2a	5.B.2b	5.C.2a	5.C.2b	6.A.2	6.B.2	6.C.2a	6.C.2b	6.D.2	7.A.2a	7.A.2b	7.C.2a	7.C.2b	10.A.2a	10.A.2b	10.A.2c	10.B.2a	10.B.2b	10.B.2c
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ES	Rain On																								X	X			X					X				X
H	Gardening: A Math Adventure																							X	X	X			X	X	X	X	X				X	
AM	Farming Is Expensive																								X	X												
AE	Illinois And U.S. Agricultural Exports																								X					X								
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AM	We're In This Together									X												X							X									
AE	Food Distribution and Preservation				X				X		X																											
AC	Picture This Agriculture Career												X				X																					
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Illinois Learning Standards Index

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Illinois Agriculture
Big Business Here And Overseas

Many people still think American agriculture resembles Old MacDonald's farm. But the farm and food sector is big business- it's one of the largest sectors in the U.S. economy. There are over 22 million workers involved in producing our food, processing it, and getting it to consumers.

Just 1.6 million of those people are the farmers and farm workers who grow our food. That's as many as the total number of workers in the steel and automobile industries combined!

In Illinois, about 69 percent of our land is used for farming. Most of it is used for family farm operations in which several family members are involved in some part of the business.

All Illinois citizens can be proud of the fact that the "Land of Lincoln" is one of the top farm exporting states in the nation. In 1997, Illinois farm products accounted for $3.7 billion in exports. That's 6.5 percent of the total amount of farm exports shipped to Japan, the Netherlands, and several other countries. Illinois ranks third in the U.S. in agricultural exports.

And those farm exports help offset the costs of the goods we import, such as oil and coffee.

Agriculture has become an important producer of wealth for the state of Illinois, thanks to a unique combination of factors including progressive farm families, technology, and natural soil and weather advantages. Illinois is among the leading producers in many categories of farm products from soybeans to Swiss cheese.

Illinois' agriculture is diverse. Different commodities are important to farmers in various regions of the state. Illinois continues to rival Iowa for its corn production and is a national leader in exports of both soybeans and feed grains, primarily corn.

Pork is also an important commodity. In 1998, nearly eight million pigs were born and raised on Illinois farms. The state ranks 25th in the number of beef cattle produced and is 17th in milk production. Northern Illinois and the southwest region near St. Louis are active centers of dairy activity.

Illinois' diversity is also illustrated by its claim to being the top producer of pumpkins and the number two manufacturer of Swiss cheese and cottage cheese. The state is third in the production of fresh-cut herbs. For you movie fans, we're also the third largest popcorn producer. The variety does not end there. Potatoes, horseradish, asparagus, and peaches are just a few of the other crops produced by Illinois farmers.

Major farm implement manufacturers are headquartered in Illinois. Feed mills, which turn basic grains and oilseeds into livestock feed, dot the countryside. River grain terminals link state grain producers to the export ships at New Orleans via the Illinois, Mississippi, and Ohio Rivers. And major grain and livestock futures exchanges in Chicago attract attention daily from across the globe.

Illinois farmers spend $5.5 billion yearly for production expenses such as seed, fuel, hired labor, machinery, and interest on farm mortgage debt. This translates into income for wage earners and businesses in non-farming sectors of the economy as well. For example, the purchase of a new tractor generates income not only for the local implement dealer, but also for the assembly worker at the tractor factory, stockholders in the manufacturing company, and truckers who transport the tractors from the factory.

Agriculture is big business in Illinois.

How To Use This Guide

Any of the materials in *Kids, Crops, and Critters in the Classroom* may be reproduced in reasonable quantities for educational purposes. Suggestions for using specific sections are included below.

Illinois Learning Standards Index:

Each lesson has been correlated with the Illinois Learning Standards, and an index listing each individual lesson and related standards is provided on page 8 and 9 of this guide. Teachers may easily locate specific standards and follow the column to related lessons.

Background Material:

Each lesson includes narrative information that may be used as background information for the teacher in preparing a class presentation or discussion. However, it may also provide valuable information to older or more advanced students.

As you discover information that is typical for your county, or local area, it should be included in your classroom presentation. In this way, you will be able to localize appropriate topics and make them more meaningful and enjoyable for your students. Examples might include copies of newspaper articles about local crop production or brochures about activities of an area packing plant or grain elevator.

Lesson Plan Activities:

Complete instructions are listed, including a list of necessary materials, procedures, related activities, and discussion questions. These are detailed as teacher-led activities to be presented to a group of students.

Student activity can be increased or decreased as appropriate for the age and grade level. Some of the lessons can be presented as a demonstration rather than a group hands-on activity. There are worksheet masters designed as student consumables. They may be used as homework, quizzes, or individual assignments.

Related Activities:

A variety of suggestions are included that may be suitable for a class activity, small group project, research assignment, or independent study project. Activities include bulletin board displays, field trips, art projects, etc. This section may spark ideas for additional teacher demonstrations, extra credit assignments, or individual exploration for energetic students.

Additional Resources

County Farm Bureaus®
(see page 353)

Illinois Farm Bureau®
Ag in the Classroom Program
1701 N. Towanda Avenue, P.O.Box 2901
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Washington, DC 20250
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Illinois State Board of Education
Agricultural Education Consultants
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100 N. First St.
Springfield, IL 62777
217-782-4321
http://isbe.state.il.us/

Illinois Department of Agriculture
P.O. Box 19281
State Fairgrounds
Springfield, IL 62794-9281
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(800) 273-4763
www.agr.state.il.us/

National Agricultural Aviation Association
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Agriculture Council of America
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www.eatchicken.com

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St. Louis, MO 63141
(314) 275-9915
www.ncga.com

National Cotton Council of America
Communications Service
1918 N. Parkway
Memphis, TN 38112
(901) 274-9030
http://cotton.org/ncc/

Check phone book for your local Soil and Water Conservation District address and phone number.

Association of Illinois Soil and Water
Conservation Districts
Attn: Education Coordinator
2520 Main St.
Springfield, IL 62702
(217) 744-3414

National Association of Conservation Districts
509 Capitol Ct., NE
Washington, DC 20002
(202) 547-6223
www.nacdnet.org

Natural Resources Conservation Service
USDA
14th and Independence Ave.
Washington, DC 20250
(202) 720-4525
www.nrcs.usda.gov

Soil and Water Conservation Society
7515 N.E. Ankeny Rd.
Ankeny, IA 50021-9764
(515) 289-2331
e-mail: swcs@swcs.org
www.swcs.org

American Dairy Association of Illinois
1 West Front Street
El Paso, IL 61738
(309) 527-4095

Dairy Management, Inc.
10255 W. Higgens Rd., Suite 900
Rosemont, IL 60018
(847) 803-2000
www.milk.co.uk/

St. Louis District Dairy Council
8710 Manchester Rd.
St. Louis, MO 63144-2793
(314) 961-3100

Dairy Council division offices:
(Call the office nearest you)

2004 S. Right St., Suite 118E
Urbana, IL 61801
(217) 244-5824

12615 Farmington Rd.
Hanna City, IL 61536
(309) 565-0741

3600 Wabash Ave.
Springfield, IL 62707
(217) 726-8480

402 Ava Rd., Suite. A
Murphysboro, IL 62966
(618) 864-2421

American Egg Board
1460 Renaissance Dr., Suite 301
Park Ridge, IL 60068
(847) 296-7043
e-mail: aeb@aeb.org
www.aeb.org

Facilitating Coordination in
Agricultural Education
Regional Office of Education
Attn: Agriculture Education Coordinator
200 S. Fredrick
Rantoul, IL 61866
(217) 893-0091
(217) 893-0024 Fax
e-mail: jyrunner@roe9.k12.il.us
www.agriculturaleducation.org

Facilitating Coordination in Agricultural
Education District Representatives:

District 1 Field Advisor
P.O. Box 190
Joy, IL 61260
(309) 584-4311
e-mail: treatr@mcol.net

District 2 Field Advisor
Cook County Farm Bureau
6438 Joliet Rd.
Countryside, IL 60525
(708) 579-6055
e-mail: biondo@ais.net

District 3 Field Advisor
220 N. Broad Street
Carlinville, IL 62626
(217) 854-2510
e-mail: lpfeiffer@macoupin.k12.il.us

District 4 Field Advisor
1401 S. Maryland Dr.
Urbana, IL 61801
(217) 333-1578
e-mail: Webel@waterleaf.itcs.uiuc.edu

District 5 Field Advisor
Farm Credit Services Building
2560 Mascoutah Ave.
Belleville, IL 62220-3468
(618) 257-8272
e-mail: dittmar@norcom2000.com

American Association of
Family and Consumer Sciences
1555 King St.
Alexandria, VA 22314
(703) 706-4600
e-mail: info@aafcs.org
www.aafcs.org

National FFA Organization
6060 FFA Drive
P.O. Box 68960
Indianapolis, IN 46268-0999
1-888-332-2668
www.ffa.org

National 4-H Council
7100 Connecticut Ave.
Chevy Chase, MD 20815-4999
(301) 961-2800
www.fourhcouncil.edu

Food Marketing Institute
655 15th Street, NW
Washington, DC 20005
(202) 452-8444
e-mail: fmi@fmi.org
www.fmi.org

American Forests
P.O. Box 2000
Washington, DC 20013
(202) 955-4500
(800) 368-5748
e-mail: info@amfor.org
www.americanforests.org

USDA Forest Service
P.O. Box 96090
Washington, DC 20090-6090
(202) 205-1661
www.fs.fed.us/

American Meat Institute
1700 North Moore Street
Suite 1600
Arlington, VA 22209
(703) 841-2400
www.meatami.org

National Pasta Association
2101 Wilson Blvd. #920
Arlington, VA 22201
(703) 841-0818
www.ilovepasta.org

Illinois Pork Producers Association
6411 S. Sixth Street Road
Springfield, IL 62707
(217) 529-3100
e-mail: mark@ilpork.com

National Pork Producers Council
P.O. Box 10383
Des Moines, IA 50306
(515) 223-2600
www.nppc.org

National Potato Council
5690 DTC Blvd., Suite 230E
Englewood, CO 80111
(303) 773-9295
www.npcspud.com

National Safety Council
1121 Spring Lake Dr.
Itasca, IL 60143-3201
(630) 285-1121
e-mail: wilkinst@nsc.org
www.nsc.org

Illinois Lamb and Wool Producers
RR 2, Box 42
El Paso, IL 61738
(309) 527-4597
www.wiu.edu/users/miag/facstaff/ipc/ilwp/home.htm

American Sheep Industry Association
6911 S. Yosemite St., Suite 200
Englewood, CO 80112-1414
(303) 771-3500
e-mail: info@sheepusa.org
www.sheepusa.org

Illinois Soybean Association
1605 Commerce Pkwy
Bloomington, IL 61704
(309) 663-7692
www.ilsoy.org

American Soybean Association
12125 Woodcrest Executive Dr., Suite 100
St. Louis, MO 63141
(314) 576-1770
www.oilseeds.org

Illinois Wheat Association
1221 North 16th Street
Murphysboro, IL 62966
(618) 687-1867
e-mail: franksr@intrnet.net

National Association of Wheat Growers
415 Second St., N.W. Suite #300
Washington, DC 20002
(202) 547-7800
e-mail: nawg@aol.com
www.wheatworld.org

You Are The Farmer

Grade Level: 4-6

Approximate Length of Activity: 45-50 minutes

Objectives:

Teacher:

1. Help students realize the importance of math in "real world" applications.
2. Familiarize students with agriculture and occupations in agriculture.

Students:

1. Understand that farming is a business which requires many different math computations.
2. Perform basic and multi-step math operations in calculating the expenses of farming.
3. Understand agriculture and the occupations related to it.

Illinois Learning Standards: 6.B.2; 6.C.2a; 6.C.2b; 7.A.2b; 15.A.2a; 15.B.2a; 17.B.2a; 17.C.2b; 17.C.2c

Introduction:

Operating a farm is a multi-faceted business. Like any business, farmers must purchase supplies and services and sell products. Farmers need a good understanding of agri-business and economics to make a profit. They work with many individuals and companies to supply the needs of their farm and sell their products. Farmers must know how to keep an organized budget, compare prices, and make wise financial decisions.

Farmers use math in many of their day-to-day operations. For example, farmers use math to determine the amount of seed they need to plant their crop and how much it will cost. They also need math to purchase equipment and make payments. Math is important for determining taxes and insurance. It also helps farmers keep track of how much their livestock weighs, how much milk their cows produce, their crop yields per acre, etc.

Students can learn that there is much more involved in farming than simply raising a few animals or planting some crops. By reading and completing the following story problems, teachers can reinforce basic math operations, while showing students some examples of how math is used in the "real world."

Materials Needed:

- "Ag Careers Are Everywhere" worksheet
- "You Are the Farmer" worksheet

Activity Outline:

1. Initiate a discussion with your students about occupations that require math. Have them name the occupations. Then turn the discussion to agricultural occupations that require math. Let them know that agriculture is the growing of food and fiber (wool, cotton, etc.). Ask them to name some agriculturally-related occupations and which of these occupations require math skills.
2. Make a list of the agriculturally-related occupations that require math on the chalkboard. If the class needs help, suggest the agricultural occupations found on the handout, "Ag Careers Are Everywhere!"
3. Once the students have a better idea of what agriculture is and know some agricultural occupations that require math, have them complete the worksheet "You Are the Farmer." The worksheet will give the students a better idea of the expenses a farmer incurs just to plant a crop in the field. When the students are done with the worksheet, go over the answers so they understand them. Discuss how a farmer needs to know math in order to run his or her business.

Discussion Questions:

1. What is agriculture?
2. What are some occupations related to agriculture?
3. How does a farmer use math in order to run his or her business?

Related Activities:

1. Ask a local farmer to come in to talk about his/her job and the importance of math in his/her work. Your local county Farm Bureau® can help to locate a speaker.
2. Have students use their knowledge to make new story problems of their own. Then have them trade with a partner and solve.
3. Research some of the agricultural occupations listed on the handout that the class is not familiar with.

To be used with:
You Are The Farmer

Name ______________________________

Ag Careers Are Everywhere!

Agriculture is the art and science of growing food and clothing. You don't have to come from a farm to have an occupation in agriculture. Any occupation that involves growing, harvesting, raising, transporting, processing, making, selling, trading or researching of food and/or fiber (for clothing) are agricultural occupations. When you stop and think about it, agriculture is all around us!

Take a look at the list of agricultural occupations below. Most agricultural occupations require math, but the ones listed here are the most prevalent.

Agricultural Production Specialists

Aquaculturalist
Greenhouse Manager
Rancher
Fruit and Vegetable Grower
Farm Manager
Specialty Animal Producer
Grain and/or Livestock Farmer
Turf Producer

Marketing, Merchandising, and Sales Representatives

Grain Merchandiser
Market Analyst
Insurance Agent
Commodity Broker
Sales Representative
Export Sales Manager
Landscape Contractor
Advertising Manager
Restaurant Manager

Scientists, Engineers, and Related Specialists

Agronomist
Animal Scientist
Research Technician
Agricultural Engineer
Environmental Scientist
Water Quality Specialist
Landscape Architect
Plant Scientist
Food Scientist

Managers and Financial Specialists

Accountant
Retail Manager
Policy Analyst
Consultant
Banker
Wholesale Manager
Food Service Manager
Economist
Insurance Agency Manager
Computer Systems Analyst
Association Manager

Communication and Education Specialists

Information Specialist
Computer Software Designer
Agricultural/Horticultural Teacher
Radio/Television Broadcaster

Social Services Professionals

Dietitian
Food Inspector
Regulatory Agent
Outdoor Recreation Specialist

Name ___________________________

You Are The Farmer

You are a no-till grain farmer in Illinois and usually plant soybeans, as well as corn. This year you make the decision to plant corn on all the ground you farm. Use the following information to complete the activity. You will have to round some answers to the nearest whole dollar, full container, or full bag.

*Seed corn costs $31 per acre.
*Fertilizer costs $44 per acre.
*Fuel, lube, and electricity cost $21 per acre.
*Herbicide costs $82.20 for a 2.5 gallon container that treats 8 acres.
*Insecticide costs $94 for a 50-pound bag. Fifty pounds treats 6.66 acres.
*Your farm is Illinois' average size of 368 acres.

1. You decide to plant corn. How much will it cost to plant seed corn on all of your acres? __________

2. You need to purchase a new tractor and planter. The bank will loan you the money to buy the equipment, but you are required to make payments of $18,500 every year for seven years. In addition, you have payments on previous purchases of $5,500 per year. What is your total annual equipment cost for one year? __________

3. You need to put fertilizer on your corn crop. How much will this cost? __________

4. To keep weeds in your corn under control, you need to apply a herbicide. How many containers will you need? __________ How much will this cost? __________

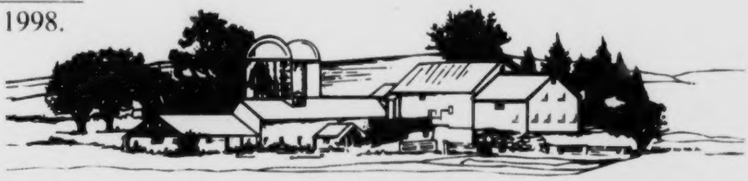
5. Most of your no-till corn is planted on last year's soybean ground and does not need any insecticide. But 80 acres of corn will be planted on last year's corn ground, and corn rootworms are a threat to the crop. You decide to apply an insecticide product. How many 50 pound bags will you need? __________ Calculate the cost. __________

6. It is time to pay your property taxes and insurance. The cost is $28 per acre. What is the total cost on all 368 acres? _______

7. You rent your farm land for $97 per acre. What is the total rent for your farm? __________

8. Your corn crop is great! You harvest 144 bushels per acre. What is the total number of bushels of corn harvested? __________

*Figures are for 1998.



To be used with:
You Are The Farmer

Answer Key

You Are The Farmer

You are a no-till grain farmer in Illinois and usually plant soybeans, as well as corn. This year you make the decision to plant corn on all the ground you farm. Use the following information to complete the activity. You will have to round some answers to the nearest whole dollar, full container, or full bag.

*Seed corn costs $31 per acre.
*Fertilizer costs $44 per acre.
*Fuel, lube, and electricity cost $21 per acre.
*Herbicide costs $82.20 for a 2.5 gallon container that treats 8 acres.
*Insecticide costs $94 for a 50-pound bag. Fifty pounds treats 6.66 acres.
*Your farm is Illinois' average size of 368 acres.

1. You decide to plant corn. How much will it cost to plant seed corn on all of your acres? **$11,408**

2. You need to purchase a new tractor and planter. The bank will loan you the money to buy the equipment, but you are required to make payments of $18,500 every year for seven years. In addition, you have payments on previous purchases of $5,500 per year. What is your total annual equipment cost for one year? **$24,000**

3. You need to put fertilizer on your corn crop. How much will this cost? **$16,192**

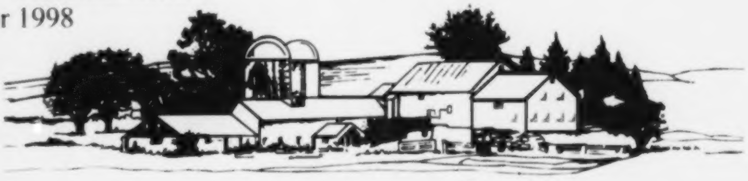
4. To keep weeds in your corn under control, you need to apply a herbicide. How many containers will you need? **47 containers** How much will this cost? **$3,863**

5. Most of your no-till corn is planted on last year's soybean ground and does not need any insecticide. But 80 acres of corn will be planted on last year's corn ground, and corn rootworms are a threat to the crop. You decide to apply an insecticide product. How many 50 pound bags will you need? **13 bags** Calculate the cost. **$1,222**

6. It is time to pay your property taxes and insurance. The cost is $28 per acre. What is the total cost on all 368 acres? **$10,304**

7. You rent your farm land for $97 per acre. What is the rent for your farm? **$35,696**

8. Your corn crop is great! You harvest 144 bushels per acre. What is the total number of bushels of corn harvested? **52,992 bushels**
   *Figures are for 1998



Sheep Statistics

Grade Level: 4-6

Approximate Length of Activity: 45 minutes

Objectives:

Teacher:

1. Teach students about sheep through a class discussion.
2. Assist students in researching the vital statistics of humans and animals.

Students:

1. Participate in a class discussion about sheep production.
2. Research the vital statistics of humans and animals.
3. Use information from several reference materials to complete a chart and answer questions about the chart.

Illinois Learning Standards: 7.A.2a; 10.A.2a; 10.B.2b; 10.B.2d; 11.A.2e; 12.A.2a; 12.B.2a; 12.B.2b; 22.A.2b; 23.A.2; 23.B.2

Introduction:

A male sheep is called a ram, the female a ewe, and the baby a lamb. Sheep eat grasses, grains, woody plants, broadleaf plants, and weeds. They are ruminants, which means they have four parts to their stomachs, just like cows. Sheep are raised in groups called flocks (five to 1000 sheep) or bands (1000 to 2000 sheep). There are over 35 breeds of sheep in the U.S. and over 900 in the world!

Sheep have split hooves to help them climb rocky hills. They do not have top front teeth so sheep are able to pull grasses out of the soil without pulling out the roots of the grass. This helps the environment because more grass will grow again. Sheep and lambs are known to be gentle animals. Unfortunately, sheep are easily attacked by coyotes, bears, foxes, and eagles. Many shepherds/caretakers of sheep use guard dogs to protect their sheep and working dogs to herd their sheep.

The fuzzy covering that grows on sheep is called wool. Sheep are sheared (given a haircut) once a year. The wool from sheep is called fleece. An average fleece weighs eight and one-half pounds. Wool is taken to a warehouse to be sorted and then to a mill to be cleaned, carded, combed, and spun. The wool is used for clothing, blankets, carpets, and other materials. Wool is a renewable resource because we can raise more sheep and sheep can always grow wool.

Sheep provide us with meat, which is also a renewable resource. We can always produce more meat from sheep, unlike an exhaustible resource like coal, which cannot be replaced for many years. Meat from a sheep less than a year old is called lamb and meat from a sheep more than a year old is called mutton. Lambs are usually taken to market when they are four to six months old and weigh 120-135 pounds. Lambs eat clover, alfalfa, fresh grasses, and grain. Their meat is mild, lightly flavored, and nutritious. Lamb is a good source of protein, which helps our bodies build strong bones and muscles. Lamb is also a good source of zinc, vitamin B, and iron. Vitamin B and iron give us energy, while zinc keeps our hair healthy and shiny. Three ounces of lamb averages only 176 calories and 78 milligrams of cholesterol. There are many different cuts of lamb such as round steaks, leg of lamb, lamb chops, and pot roasts. Various parts of sheep are used to make by-products like shampoo, soap, crayons, medicines, paints, tires, dog food, dice, ice cream, bandages, marshmallows, artist brushes, baseballs, shoe cream, chewing gum, and detergents.

Materials Needed:

- "Sheep Statistics" worksheet
- Reference materials such as books on sheep, the Internet, and encyclopedias
- A book about sheep (see Activity Outline for title suggestions)
- *Ag Mag* 13 "Simply Sheepish" (one package – optional)

Activity Outline:

1. Use the information in the introduction to discuss sheep. It would be helpful to order a free package of "Simply Sheepish" *Ag Mag* 13 from your county Farm Bureau®. This colorful issue talks about selling sheep, shearing sheep, spinning wool, lambs, and careers with sheep. If possible, you may want to read books such as *A New Coat for Anna* by Harriet Ziefert and Anita Lobel, *Charlie Needs a Cloak* by Tomie dePaola, *What was it Before it was a Sweater?* by Roseva Shreckhise, or *Hooray for Sheep Farming* by Bobbie Kalman.
2. Ask students to complete the "Sheep Statistics" worksheet. Using the worksheet and reference materials, students will compare the body temperature, pulse/heart rate, respiration rate, gestation period, and weight of sheep to humans and other animals.
3. As a class, create a chart comparing the vital statistics of sheep, humans, and many other animals by compiling all of the student worksheets.

Discussion Questions:

1. Why are sheep and wool called a renewable resource?
2. What are some by-products of sheep?
3. How are the vital statistics of sheep different than that of humans?

Related Activities:

1. Look at the market prices for sheep in an agriculture publication (such as the Illinois Farm Bureau® *FarmWeek* at www.fb.com/ilfb) or on the Internet. Keep a record of prices over time and graph the results.
2. Research sheep by-products. Identify the parts of the sheep that each by-product comes from.

Other Resources:

Sheep Booklet with facts & activities, K-2, Ag Experience, 3144 N. G Street, Merced CA 95340, (209) 358-9057.

To be used with:
Sheep Statistics

Name ______________________________

Sheep Statistics

You will find the vital statistics for sheep below. Research to find the vital statistics for humans and one other animal of your choice. Fill in the chart and then answer the questions below.

Pulse/Heart Rate: the number of heart beats per minute
Respiration Rate: the number of breaths per minute
Gestation Period: the length of pregnancy

	Body Temperature	**Pulse/Heart Rate**	**Respiration Rate**	**Gestation Period**	**Weight**
Sheep	100.9°-103.8° F	70-80 beats per minute	12-20 breaths per minute	145 days	Lambs: 7-15 lbs., Adult Ewes: 150-200 lbs.
Humans					Baby: Adult:
Animal of your choice					Baby: Adult:

1. Which is higher: the temperature of a sheep or the temperature of a human?
2. Which had the highest pulse/heart rate?
3. What does respiration rate mean?
4. Do humans have a higher or lower respiration rate than the animal you chose?
5. Which is lower, the gestation period for a sheep or the gestation period for a human?
6. Do human babies have a higher or lower weight than lambs when they are born?

Brown Eyes, Blue Eyes

Grade Level: 4-6

Approximate Length of Activity: 45 minutes

Objectives:

Teacher:

1. Discuss the term "genes" with students.
2. Help students understand how genes are passed to offspring through examples and a hands-on activity.

Students:

1. Show an understanding of genetics by determining genetic possibilities for offspring.
2. Show an understanding of probability by determining the chances of genetic combinations for offspring.
3. Learn the terms "dominant" and "recessive."

Illinois Learning Standards: 10.A.2c; 10.B.2d; 10.C.2a; 10.C.2b; 12.A.2a; 12.A.2b

Introduction:

Genes are in every living organism. They determine characteristics about the organism such as hair color, height, and even the ability to curl your tongue! Every organism has between 50,000 and 100,000 genes. Genes are a segment of a DNA molecule in a chromosome contained in a cell. They determine characteristics by influencing chemical and physical processes during growth and aging. Genetic studies are important in agriculture for crop and livestock improvement, as well as in other areas.

Humans have two of every kind of gene, one from their mother and one from their father. Only one gene from each parent is passed to offspring for a particular trait.

Genes can be dominant or recessive. Dominant genes overpower recessive genes. For example, eye color; the gene for brown eyes is dominant and the gene for blue eyes is recessive. Dominant genes are always expressed in offspring. Recessive genes are expressed in offspring only if both parents contribute recessive genes. Therefore, if you received a brown-eye gene from either one of your parents, you will have brown eyes.

If you received a brown-eye gene from your father (B) and a brown-eye gene from your mother (B), your genes for eye color would be BB. Your eyes would be brown because you received only brown-eye genes.

If you received a brown-eye gene from your father (B) and a blue-eye gene from your mother (b), your genes for eye color would be Bb. Your eyes would be brown because the dominant brown-eye gene overpowered the recessive blue-eye gene.

If you received a blue-eye gene from your father (b) and a brown-eye gene from your mother (B), your genes for eye color would be Bb. Your eyes would be brown because the dominant brown-eye gene overpowered the recessive blue-eye gene.

If you received a blue-eye gene from your father (b) and a blue-eye gene from your mother (b), your genes for eye color would be bb. Your eyes would be blue because you only received blue-eye genes and there are no brown-eye genes to overpower the blue-eye genes.

Math Connection: Probability is the chance that something will happen. Chances can be determined by looking at possibilities. When humans receive one gene from each parent, there are four possibilities. In this lesson, students will determine gene possibilities and the chances of offspring receiving those possibilities.

Materials Needed:

- 2 paper bags
- 8 small pieces of paper ("B" for brown eyes written on four, "b" for blue eyes written on four)

Activity Outline:

1. Discuss genes with the students using the brown-eye/blue-eye example.
2. Remind the students that each parent has two genes for eye color. Each parent will pass only one eye-color gene to their child.
3. Draw a Punnet Square on the blackboard. The Punnet Square is a way of representing parental traits and showing the chances of offspring inheriting certain traits. Here is an example:

		Mom	
		B	b
Dad	b	Bb	bb
	b	Bb	bb

   In this situation, the Mom has the genes "Bb," therefore she has brown eyes. The Dad has the genes "bb," therefore he has blue eyes. The child will receive "Bb" or "bb" because those are the only possible combinations. The child has a 50% chance of brown eyes (Bb) and a 50% chance of blue eyes (bb).
4. To conduct a demonstration, label one paper bag "Mom" and the other "Dad."
5. Make eight slips of paper. Write "B" on four slips and "b" on the other four slips. Explain to the students that the "B" represents brown eyes and the "b" represents blue eyes. Turn the slips over so you cannot see the letters on them. Mix up the slips. Randomly select two slips and place them in the bag labeled "Mom." Place two other slips in the bag labeled "Dad."

6. The slips in each bag represent the eye-color genes the parents have. Talk about the eye color possibilities of the parents. Either parent could have BB, Bb, or bb.
7. Let a student draw the genes from each bag to determine what eye-color genes each parent has. Take these genes and make a Punnet Square to determine the eye color possibilities of the child.
8. Continue the demonstration using other eye color combinations for the parents.

Discussion Questions:

1. Why are genes important?
2. What are dominant and recessive genes?
3. How many possibilities are there for gene combinations when each parent contributes one gene for each trait?
4. What is probability?

Related Activities:

1. Discuss DNA strands and how they affect human characteristics.
2. Create strands of DNA using construction paper.
3. Create a model of an animal or plant cell.
4. Invite a crop specialist or livestock producer to discuss genetic engineering of crops/livestock and its value.

Other Resources:

"A Quick Dip in the Gene Pool," an integrated study of agri-food biotechnology for secondary science, social studies, and language arts students. A Partnership Production Coordinated by Agriculture in the Classroom, Alberta Agriculture, Food & Rural Development, 2nd Floor, 700-113 Street, Edmonton, Alberta, T6H 5T6, (403) 427-2171.

Kernel Counting

Grade Level: 4-6

Approximate Length of Activity: 30-40 minutes

Objectives:

Teacher:

1. Integrate the agricultural concept of food processing into math.
2. Have students solve different types of math problems and work with a graph to gain an understanding of how processing adds value to agricultural products.

Students:

1. Define how processing adds value to agricultural products and list the steps in commercial processing of agricultural products.
2. Solve a variety of math problems involving addition, subtraction, multiplication, and division.
3. Complete a graph.

Illinois Learning Standards: 6.B.2; 6.C.2a; 7.A.2b; 15.A.2a; 15.B.2b

Introduction:

Nearly all agricultural products must be processed in some manner before they can be used. Since processing makes the product more valuable to consumers, the term "value-added processing" is often used. Each step in the processing adds value to the final form of the product. Pork into sausage, wheat into food, wool into sweaters, or timber into construction lumber are all types of processing. Depending upon the final product, processing can be done in a few steps, or it may take many.

For example, to process wheat into foods, the wheat must first be made into flour. The place where wheat is made into flour is a mill and the people who process the wheat are millers. At the mill, the wheat is put through a cleaning process to remove foreign matter (weed seeds, corn seeds, beans stems). Rollers then press over the wheat kernels to break them into pieces. This is repeated many times to make a soft powdery substance we know as flour. Next the miller adds a special ingredient to the flour to whiten it, along with B-vitamins and iron for nutrients. The flour is shipped in bags to the bakery or grocery store. Bakers like to use Illinois wheat flour to make food items such as cakes, cookies, biscuits, pancakes, pretzels, and ice cream cones.

Presently, U.S. agricultural processing is a multi-billion dollar industry. Engineers have designed machines that process agricultural products quickly, efficiently, and in large quantities. Commercial agricultural processing is much different than processing a small quantity of a product at home, since the machines do much of the work. The agricultural industry is able to supply low-cost, quality products because of high technology.

Glossary:

Bran – the outer layer of a wheat kernel included in whole wheat flour for additional fiber.
Endosperm – the white, inner part of a wheat kernel ground for white flour.
Germ – the embryo or sprouting section of a wheat kernel that is high in oil.
Gluten – a protein in wheat which allows dough to rise and stretch.
Mill – to grind grain into flour or meal.
Yeast – a leavening agent that causes dough to rise and beverages to ferment.
Gross Profit – total income before expenses are subtracted.
Net Profit – the final profit after all expenses have been subtracted.

Materials Needed:

- "Kernel Counting" worksheet
- "Where Does Your Food Dollar Go?" worksheet

Activity Outline:

1. Use the "Kernel Counting" worksheet to have the students identify the parts of the wheat kernel; then complete the math problems about wheat production and flour milling.
2. Discuss the problems and answer any questions the students have.
3. Use the "Where Does Your Food Dollar Go?" worksheet to discuss with the class each of the seven food dollar components for processing food. Explain to the students that the price they pay to purchase an item at the grocery store is more than what the farmer receives for the product. For every dollar spent, part of it goes to the farmer and the rest is distributed to other costs.
   The amount the farmer receives varies from one product to another and over time. But on average, farmers receive about 21 cents of the retail food dollar. The price the farmer receives for his product plays only a small role in the total price the consumer pays for food in the grocery store. An ear of corn, a bushel of wheat, or a live steer are of little use to you in their "natural" states. The process of bringing food from the farm to your table includes many steps. Each step toward a finished product adds value – and cost – right up to the time you purchase it. Have the students look at the chart on their worksheets to see what a dollar spent on food paid for in 1997. Discuss the meaning of each component and have the students give examples of each.
4. Have the students label each piece of the dollar with the cost of each component.

Discussion Questions:

1. Why do you think the agricultural industry is able to supply low-cost, quality products?
2. What are some of the components covered in the cost of food?
3. Which component costs the most? The least? Explain the reasons for the differences.
4. Why do you think consumers are willing to pay more for processed items such as sausage, foods made of wheat, sweaters, etc., than they are for raw commodities?

Related Activities:

1. Have students research the career opportunities needed to make and sell a loaf of bread.
2. Visit a local bakery or doughnut shop to see how bread is processed.

Lesson adapted from the National FFA Organization's Food for America Resource Guide. Copyright 1996 National FFA Organization. Reprinted with permission of the National FFA Organization.

To be used with:
Kernel Counting

Name ____________________________

Kernel Counting

Identify the endosperm, bran, and germ of this wheat kernel. Then complete the math problems related to wheat.

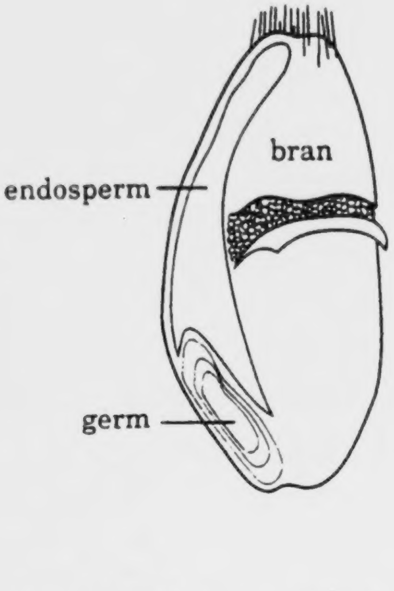
1. An acre is about the size of a football field. Joe raised 37 bushels of wheat per acre in his 75-acre field. How many total bushels of wheat did he produce? __________________

2. Ann has 1800 bushels of wheat stored in a bin on the farm and decides to sell it at $2.70 per bushel. What is her gross income on the sale? __________________

3. John sold 1500 bushels of wheat for $3900. His expenses were $1634 for land rent; $1032 for seed, fertilizer, and pesticides; $688 for fuel, machinery repairs, and equipment depreciation; and $516 for taxes, interest, and other expenses. What is John's net profit? __________________

4. One bushel of wheat can produce 70 loaves of bread. How many bushels are needed to produce 5740 loaves? __________________

5. After milling, the weight of flour is 76 percent of the original weight of the wheat. How many pounds of flour can be milled from one ton (2000 pounds) of wheat? __________________



6. One ton of wheat costs $87, and one ton of flour costs $210. How much did the value of wheat increase by processing it into flour? __________________

7. A large bakery can produce 18-dozen hamburger buns per minute. How many buns can it produce per hour? __________________

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To be used with:
Kernel Counting **Answer Key**

Kernel Counting

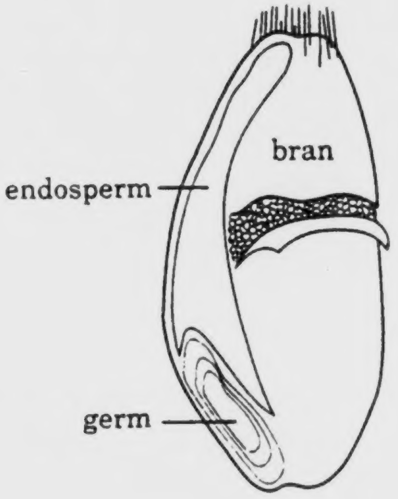
Identify the endosperm, bran, and germ of this wheat kernel. Then complete the math problems related to wheat.

1. An acre is about the size of a football field. Joe raised 37 bushels of wheat per acre in his 75-acre field. How many total bushels of wheat did he produce? **2775 bushels** (37 bushels per acre x 75 acres)

2. Ann has 1800 bushels of wheat stored in a bin on the farm and decides to sell it at $2.70 per bushel. What is her gross income on the sale? **$4860** (1800 bushels x $2.70 per bushel)

3. John sold 1500 bushels of wheat for $3900. His expenses were $1634 for land rent; $1032 for seed, fertilizer, and pesticides; $688 for fuel, machinery repairs, and equipment depreciation; and $516 for taxes, interest, and other expenses. What is John's net profit? **$30** ($3900 – {$1634 + $1032 + $688 + $516})

4. One bushel of wheat can produce 70 loaves of bread. How many bushels are needed to produce 5740 loaves? **82 bushels** (5740÷7)



5. After milling, the weight of flour is 76 percent of the original weight of the wheat. How many pounds of flour can be milled from one ton (2000 pounds) of wheat? **1520 pounds of flour** (2000 x .76)

6. One ton of wheat costs $87, and one ton of flour costs $210. How much did the value of wheat increase by processing it into flour? **$123** ($210 - $87)

7. A large bakery can produce 18-dozen hamburger buns per minute. How many buns can it produce per hour? **12,960 hamburger buns** (18 x 12 x 60)

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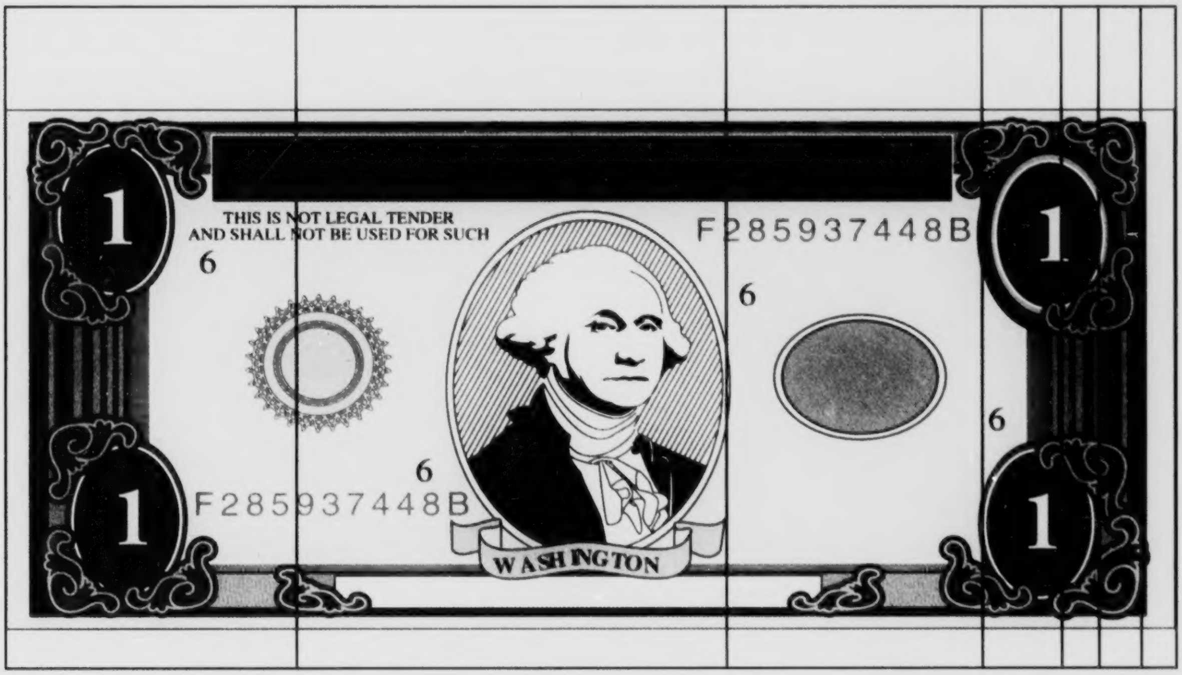
To be used with:
Kernel Counting

Name ______________________

Where Does Your Food Dollar Go?

Each dollar you spend on food is divided many ways. Each person and process involved in getting the food to you receives a share of each food dollar. Using the numbers on the chart below, label each part of the diagram with the monetary amount and the category.

One dollar spent on food in 1997 paid for:	
Farm value	21¢
Labor	38.5¢
Packaging	8.5¢
Fuels and electricity	3.5¢
Transportation	4¢
Before-tax profit	3.5¢
Interest, taxes, and other costs	21¢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Source: USDA's Economic Research Service

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To be used with:
Kernel Counting

Answer Key

Where Does Your Food Dollar Go?

Each dollar you spend on food is divided many ways. Each person and process involved in getting the food to you receives a share of each food dollar. Using the numbers on the chart below, label each part of the diagram with the monetary amount and the category.

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Farm value	21¢
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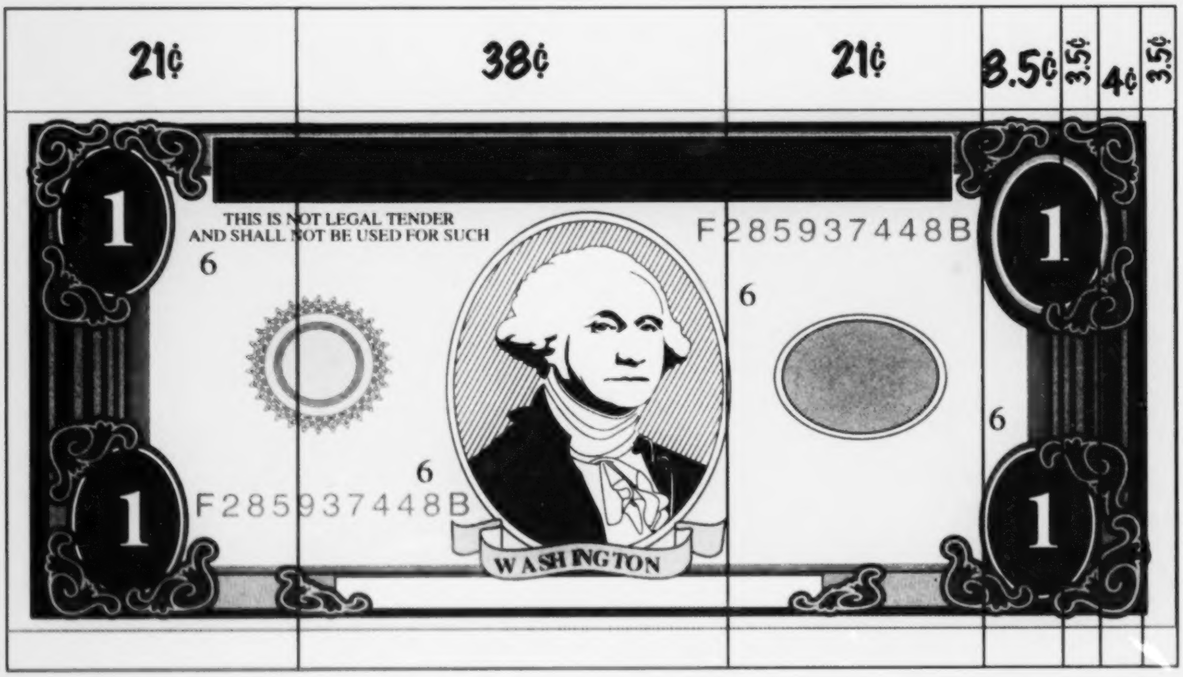
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Source: USDA's Economic Research Service

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Rain On

Grade Level: 4-6

Approximate Length of Activity: 20 minutes

Objectives:

Teacher:

1. Provide students with hands-on activities to understand precipitation and condensation.
2. Provide information about the earth's water cycle and its importance to agriculture.
3. Assist students with researching, graphing, measuring, and math skills.

Students:

1. Learn about the water cycle of the earth through evaporation, condensation, and precipitation.
2. Learn how clouds form and then explain the process during an activity about cloud formation.
3. Explain why clouds and rainfall are important to Illinois agriculture.
4. Use research, graphing, and math skills to collect rainfall data, organize it, and answer questions about it.
5. Use measuring and graphing skills to collect rainfall.

Illinois Learning Standards: 6.B.2; 6.C.2a; 7.A.2a; 10.A.2b; 10.B.2c; 11.A.2b; 12.D.2b; 12.E.2a; 17.B.2a; 17.C.2a

Introduction:

The earth's water cycle involves the movement of water from oceans to air to land and back to the oceans. This happens through evaporation, condensation, and precipitation. Evaporation occurs when water on earth is warmed and turned into a gas that disperses in the air. Condensation occurs when water particles in the air cling together because they are in a cooler environment. Precipitation forms when water from the air falls on the earth because the condensed water has become so heavy.

Clouds are formed from condensation of water in cool air. Water that evaporates into the air becomes colder as it rises. This causes condensation of water. There are several types of clouds. The height and temperature at which the clouds are formed determine the cloud type. Cirrus clouds form as water freezes and are high and feathery. Cumulus clouds are seen at all heights on dry, sunny days. They are fluffy with flat bases. Stratus clouds look like a low sheet across the sky and cause drizzles. Other examples of cloud types are nimbostratus, cirrocumulus, stratocumulus, and altostratus.

Often aircraft look like they leave a cloud behind them. This happens because its exhaust system sends out hot gases with water vapor. As this vapor cools, it condenses and freezes in the cold air and looks like a cloud.

Clouds are important to agriculture because they determine the amount of water that will fall on crops. Farmers depend on rainfall each year for the survival of their plants. Southern Illinois receives 40 inches of precipitation a year on average. Northern Illinois only receives 34 inches on average. Some Illinois farmers use irrigation to provide their crops with additional water.

Materials Needed:

- "Rain On" worksheet
- 2 two-liter plastic bottles
- Warm water
- 3" x 5" black piece of paper
- Matches
- Small plastic resealable bag
- Ice
- Ruler

Activity Outline:

1. Discuss the above information about the earth's water cycle, weather, and agriculture.
2. Define condensation and then create a cloud with your students. This activity may be done as a demonstration since a lighted match is involved.
    a. Fill a two-liter bottle one-third full of warm water.
    b. Tape a black 3" x 5" piece of paper on the back of the two-liter bottle.
    c. Light a match and drop it in the container.
    d. Immediately cover the container with a small resealable plastic bag of ice. Start a stopwatch to record the time it takes for you to see a cloud.
    e. A cloud will form in the bottle. The black piece of paper will help you see it.
    f. Discuss what happened. A cloud formed because the warm water evaporated and then condensed when it was cooled. Condensing caused drops to form on small pieces of dust (match smoke). All of the drops together formed a cloud.
    g. Try the activity again and compare the time that passed before a cloud was seen.

3. Define precipitation and conduct rainfall activities.
    a. Collect and measure rainfall outside your school by cutting a two-liter bottle about four inches from the top. After cutting all the way around the bottle, remove the top piece and place it upside down in the bottom piece. The top piece is now a funnel to collect the rain and a barrier to prevent some evaporation. The bottom piece is now a collecting jar. Sink the bottle in the ground away from trees and buildings to collect rain. Use a ruler to measure the rainfall by day, week, etc. and ask students to create a graph.
    b. Ask the students to complete the "Rain On" worksheet. Students will use addition, subtraction, and averaging skills to answer questions about rainfall.

Discussion Questions:

1. Why is precipitation important to agriculture?
2. Why are clouds important to agriculture?
3. How do clouds form?
4. What are the three simple stages of the earth's water cycle?

Related Activities:

1. Create rain in your classroom: Boil water until steam rises because the water is evaporating. Hold an ice cube tray about five inches above the steam. As the steam rises, water droplets will form on the bottom of the ice cube tray and then fall like rain.
2. Read *The Cloud Book* by Tomie de Paola.
3. Use cotton balls to create different types of clouds on paper.
4. Watch evaporation: Pour a puddle of water on the sidewalk and use chalk to draw a line around it. Look at the puddle after an hour has passed and draw a new line around it. Has some of the water evaporated? (For an additional experiment, pour a puddle in the shade and a puddle in the sun. Compare the evaporation rate.)

To be used with:
Rain On

Name ______________________________

Rain On

Use the rainfall chart to answer the following questions.

How many inches of precipitation fell in May? ____________

How many inches of precipitation fell in August? ___________

What was the difference in precipitation between May and August? ____________

How many inches of precipitation fell in April, May, and June combined? _________

How many inches of precipitation fell in October, November, and December combined? ___________

What was the total precipitation for 1997 in Illinois? ____________

What was the 1997 average precipitation per month in Illinois? ___________

Which month had the most precipitation? ______________

1997 Average Precipitation in Illinois
(Inches)

Jan	2.53	**July**	2.22
Feb	3.88	**Aug**	4.81
Mar	3.04	**Sep**	2.34
Apr	2.34	**Oct**	1.95
May	4.02	**Nov**	2.46
June	3.57	**Dec**	1.95

To be used with:
Rain On

Answer Key

Rain On

Use the rainfall chart to answer the following questions.

How many inches of precipitation fell in May? **4.02 inches**

How many inches of precipitation fell in August? **4.81 inches**

What was the difference in precipitation between May and August? **.79 inch**

How many inches of precipitation fell in April, May, and June combined? **9.93 inches**

How many inches of precipitation fell in October, November, and December combined? **6.36 inches**

What was the total precipitation for 1997 in Illinois? **35.11 inches**

What was the 1997 average precipitation per month in Illinois? **2.93 inches**

Which month had the most precipitation? **August**

1997 Average Precipitation in Illinois (Inches)

Jan	2.53	**July**	2.22
Feb	3.88	**Aug**	4.81
Mar	3.04	**Sep**	2.34
Apr	2.34	**Oct**	1.95
May	4.02	**Nov**	2.46
June	3.57	**Dec**	1.95

Gardening: A Math Adventure

Grade Level: 4-6

Approximate Length of Activity: Two class periods plus gardening time

Objectives:

Teacher:

1. Help students understand how math computations can be applied to a "real life" situation (planting a garden).
2. Help students learn about cooperation and teamwork by making decisions about their garden.

Students:

1. Apply math computation skills (addition and multiplication) to a real life situation.
2. Follow step-by-step directions to complete a class garden.
3. Use group decision-making skills to determine the kinds of items a garden will have.
4. Create graphs from groups of information.

Illinois Learning Standards: 6.A.2; 6.B.2; 6.C.2a; 7.A.2a; 7.A.2b; 7.C.2a; 7.C.2b; 10.A.2a; 10.B.2b

Introduction:

Gardening is the cultivation of plants, usually in or near the home, as a hobby. Gardening is closely related to horticulture. Horticulture is the growth of fruits, vegetables, flowers, shrubs, grass, and trees. Plants are made up of roots, stems, and leaves. The roots help to anchor the plant in the soil. They also absorb water and minerals to promote plant growth. Stems of plants are various shapes and sizes. Twigs, branches, and trunks are all stems of plants. Some stems grow partly underground, but most stems grow above ground. Stems support the leaves and flowers of plants so they can receive an adequate amount of sunlight. Leaves have the job of providing food for the plant. The leaves need sunlight, which provides energy to combine carbon dioxide, water, and minerals to make food for the plant. This process is called photosynthesis.

Plants are important to all living things. They provide us with oxygen to breathe, food to eat, and clothes to wear. Some plants also provide us with wood to build homes and many other things.

We get food from many different parts of the plant. Some plants such as carrots and sweet potatoes are actually the roots of the plant. Corn, soybeans, and wheat are seeds of the plant.

These three types of seeds provide us with food that is used to make many foods and products. We eat the leaves of plants when we eat lettuce and celery. Broccoli and cauliflower are actually the flower buds of plants. Oranges, bananas, and apples are the fruits of plants.

Plants also provide us with clothing, wood, and medicine. Cotton plants provide us with cotton for many types of material products such as clothing, sheets, and curtains. Trees provide us with lumber so we can make paper, furniture, and most importantly, houses. Wood is also used in various parts of the world for people to burn so they have heat to cook food and heat their home. Plants also provide us with quinine, digitalis, and cortisone medicines to help treat human diseases and conditions.

Your students can plan and plant a garden right on the school grounds. This project is an exciting way to teach math using addition, multiplication, bar graphs, and line graphs. From the beginning layout to the bountiful harvest, fun math situations can be worked over and over. Your students will understand that math is needed in the "real" world, and it can be a lot of fun.

Types of Gardens to Plant:

1. Rainbow gardens: Identify flowers and other plants that will add color and interest to your garden.
2. Soup and salad gardens: Think about favorite soups and salads – then grow them! Vegetables may include lettuce, tomatoes, spinach, carrots, celery, radishes, onions, cucumbers, potatoes, peas, and corn.
3. Butterfly gardens: Choose varieties of plants that attract butterflies. A helpful book may be *Landscaping for Wildlife* by Carrol Henderson.

Materials Needed:

- Graph paper
- Colored pencils
- Pencil
- Paper
- Various seed packages (examples include pumpkin, corn, cantaloupe, carrots, onions, tomatoes, and green beans)

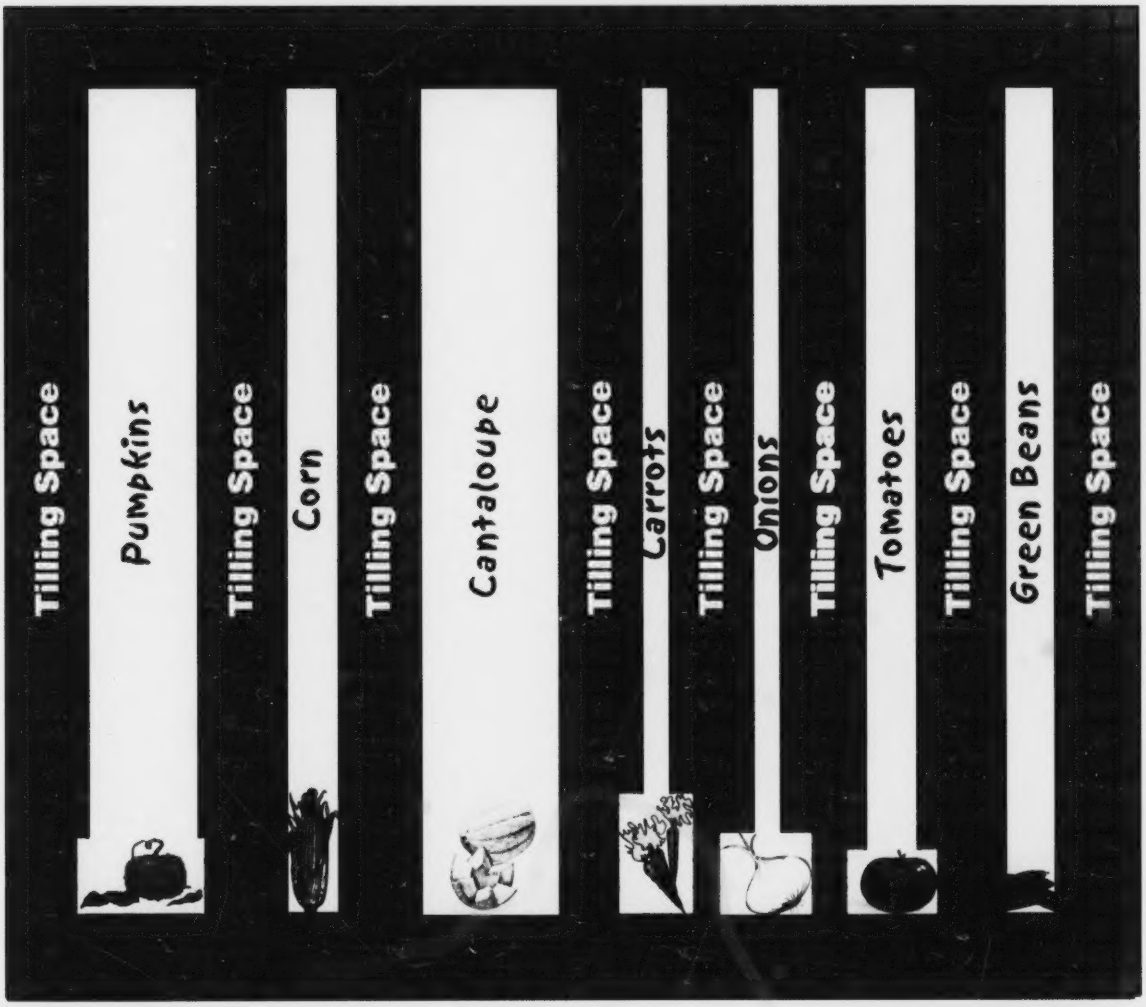
Activity Outline:

1. Have your students design a layout of a garden. First they must decide what they would like to plant in their garden. For example, your students may choose pumpkins, corn, cantaloupes, carrots, onions, tomatoes, and green beans.
2. To design the layout of a garden, each student will construct a small model of a garden using colored pencils on graph paper. Each color will represent a different plant. Each square on the graph will represent a square foot. (For example, a plant that spreads four feet will be four squares wide and four squares high.) Information included on seed packages will be helpful in planning the layout of the garden. **Do not let students begin this project until you have relayed all information in steps 1-5 of this activity outline. If they begin now, they will not have room for tilling.*

3. Here is a sample of the space used for various plants.

Pumpkin	4 feet
Corn	2 feet
Cantaloupe	5 feet
Carrots	1 foot
Onions	1 foot
Tomatoes	2 feet
Green Beans	2 feet
Total	**17 feet**

4. When coloring the area used for plants, three feet should be allotted between each row of plants for tilling. Since the sample garden (including the plants listed in #1) has seven different plants, there will need to be six tiller spaces between the rows. A three-foot border on each side of the garden is also needed for tilling space.
5. Here is a diagram showing the sample garden discussed above with 30 foot rows:


Tilling Space
Pumpkins
Tilling Space
Corn
Tilling Space
Cantaloupe
Tilling Space
Carrots
Tilling Space
Onions
Tilling Space
Tomatoes
Tilling Space
Green Beans
Tilling Space

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6. Ask your students to find the length and width of their gardens.
    a. To find the length, either count the squares or add together the length of the rows and the tilling space on the borders. The length of the rows in the sample garden is 30 feet and the tilling space needed on the borders is six feet (three feet on each end), so the total length is 36 feet.
    b. To find the width, either count the squares or add together the total feet of the rows, the tilling space between the rows, and the tilling space on the borders of the garden. In the sample garden, the total feet of the rows is 17 feet, the total tilling space between the rows is 18 feet, and the total tilling space needed on the sides of the garden is six feet, so the total width is 41 feet.
7. If possible, allow your students to plant a garden at your school using one of the graph paper models. The expenses for this project will include the cost of the seeds, fertilizer, and organic pesticides. The soil will need to be tilled or plowed prior to planting. The seed packages vary in price. One package of seeds is sufficient for at least 60 feet of space. An average sack of fertilizer will cover 1500 sq. ft. The sample garden discussed above is 1476 sq. ft. (36' X 41'), so an average sack of fertilizer would be sufficient.
8. As the garden produces vegetables, the class can keep a record of the harvest. Putting the daily results on a bar or line graph is an excellent way for students to learn how to display data and compare at a glance the production of the plant. Since the garden will be growing over the summer, your students may end up charting the harvest at the beginning of their school year and planting a garden at the end.

Discussion Questions:

1. Which vegetable will need the most space in our garden?
2. Which vegetable will need the least space?
3. If we doubled the size of our garden, what would be its new area?
4. How many bags of fertilizer will our new garden need?
5. Figure the average price of a package of seeds using the seeds we have purchased.
6. Create a bar graph displaying the cost of each package of seeds. Which seeds cost the most? Which seeds cost the least?

Related Activities:

1. Set aside an afternoon in the fall to enjoy the bountiful harvest.
2. Donate some of your garden's harvest to a local food bank or homeless shelter.
3. Ask a produce manager from a local grocery store to come in and talk about his/her job and how the store receives its produce.

Farming Is Expensive

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

1. Provide math computation practice.
2. Provide information on the expenses involved in managing a farming business.

Students:

1. Practice math computations by solving problems related to farming expenses.
2. Gain knowledge of farm expenses.

Illinois Learning Standards: 6.B.2; 6.C.2a

Introduction:

Operating a farm is a multi-faceted business. Like any business, farmers must purchase supplies and sell products. Farmers need a good understanding of agribusiness and economics to make a profit. They work with many individuals and companies to supply the needs of their farm and sell their products. Farmers must know how to keep an organized budget, compare prices, and make wise financial decisions.

Farmers use math in many of their day-to-day operations. For example, they use it to determine the amount of seed they need to plant their crop and how much it will cost. They also use math to purchase equipment and make payments. Math is important for determining taxes and insurance. It also allows farmers to keep track of how much their livestock weighs, how much milk their cows produce, their crop yields per acre, etc.

Students can learn that there is much more involved in farming than simply raising a few animals or planting some crops. By reading and completing the following story problems, teachers can reinforce basic math operations while at the same time show students some examples of how math is used in the "real world."

Materials Needed:

- "Farming Makes Sense" worksheet

Activity Outline:

1. Review the information from the introduction.
2. Hand out the worksheet, "Farming Makes Sense" and have students calculate the answers.
3. Review the answers and have students explain their work.
4. Have the students write their own story problems that involve farm equipment and expenses. Utilize farm ads to find out the cost of machinery.
5. Students can exchange their story problems with a partner. Have them solve their partner's story problems.

Discussion Questions:

1. What is an expensive piece of equipment that farmers need? (tractor)
2. If a tractor costs $80,000 and a computer costs $1600, how many computers could you buy for the price of the tractor?
3. What did you learn about farming that surprised you or you did not know before?

Related Activities:

1. Have students research different types of farm equipment.
2. Compare past years' farm equipment prices to today's farm equipment prices.
3. Invite a farm implement dealer to visit your class.

To be used with:
Farming Is Expensive

Name ______________________________

Farming Makes Sense

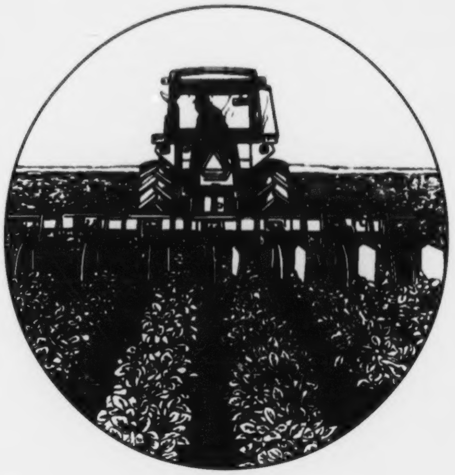
1. John is going to plant 20 acres of corn, but first he needs to buy seed. If he needs one bag of seed corn to plant three acres, how many bags does he need to plant all 20 acres?

2. Insects are hurting Bill's corn crop. He must apply crop protection products if he plans to harvest any crop. He needs 10 one-quart packages of chemicals for his 160 acres. Each package costs $50. What will his total cost be?

3. Sarah needs more feed for her cattle. She needs to buy 150 bushels of corn. One bushel costs $1.91. How much will 150 bushels cost?

4. Jill rents 100 acres of land to grow soybeans. It costs $97 to rent just one acre. What is the total rent for 100 acres?

5. It takes 8000 gallons of diesel fuel to run the equipment on Phil's 1000-acre farm. What is the total cost of the fuel if one gallon costs $1.23?



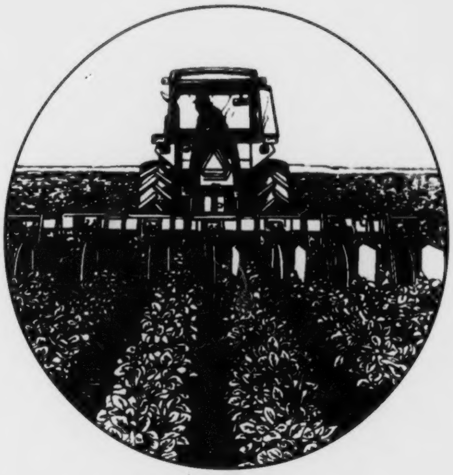
Farming Makes Sense

1. John is going to plant 20 acres of corn, but first he needs to buy seed. If he needs one bag of seed corn to plant three acres, how many bags does he need to plant all 20 acres? **7 bags**

2. Insects are hurting Bill's corn crop. He must apply crop protection products if he plans to harvest any crop. He needs 10 one-quart packages of chemicals for his 160 acres. Each package costs $50. What will his total cost be? **$500**

3. Sarah needs more feed for her cattle. She needs to buy 150 bushels of corn. One bushel costs $1.91. How much will 150 bushels cost? **$286.50**

4. Jill rents 100 acres of land to grow soybeans. It costs $97 to rent just one acre. What is the total rent for 100 acres? **$9700**



5. It takes 8000 gallons of diesel fuel to run the equipment on Phil's 1000-acre farm. What is the total cost of the fuel if one gallon costs $1.23? **$9840**

Illinois and U.S. Agricultural Exports

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

Help students realize the importance of Illinois' agricultural products.

Students:

1. Learn the terms import and export.
2. Learn what countries Illinois exports agricultural products to.
3. Use statistics to determine the percentage of Illinois exports.

Illinois Learning Standards: 6.B.2; 7.A.2b; 15.A.2a; 15.B.2b; 15.D.2a

Introduction:

Illinois farmers have an important role in supplying safe, fresh food and farm products to the U.S. and the world. Illinois farmers produce everything from cereal grains, milk, and lean meats to delicious fresh fruits and vegetables.

The United States imports and exports many agricultural products. An export is a product that is sold to another country. The U.S. and Illinois export many items including soybeans, corn, wheat, cotton, beef, pork, apples, and grapes. An import is a product that is brought into a nation from a foreign country. The U.S. imports items such as coffee, tea, spices, silk, pineapple, bananas, sugar, and fish. Illinois is one of many states that imports these products.

This lesson is designed to teach the terms export and import. It is also designed to illustrate how Illinois is ranked in exporting compared to its size.

Materials Needed:

- "Illinois and U.S. Exports" worksheet
- "Export Map" worksheet
- Almanac or other resource books

Activity Outline:

1. Begin by discussing the words "import" and "export." If the students can't come up with a definition, pass out the "Export Map" worksheet and read the definitions. Discuss items that they know are imported. Don't forget to mention cars and electronic goods. Also discuss items that are exported.
2. Ask the students to check the tags or printing on an article of clothing they are wearing and look for the country it was made in. Students may look on shirts, shoes, pants, socks, accessories, or anything else they may be wearing. For students who cannot find an article of clothing which lists the country of origin, you may want to have some belts, vests, or other accessories available for them to borrow.
3. Begin by going around the classroom and asking each student where one article of their clothing was made. Write each person's country on the chalkboard. Keep tallies if more than one article of clothing was made in the same country. When done, ask the students how many countries are on the chalkboard. Then ask them if one country made more than one article of clothing. How many articles of clothing did the country make? How many countries made more than one article of clothing? Discuss why countries are able to produce and export or sell (if made in the U.S.) articles of clothing.
4. Use the "Export Map" worksheet to answer the questions on the "Illinois and U.S. Exports" worksheet. The 1998 statistics will help you figure out some math facts about Illinois and its importance in agricultural exporting.

Discussion Questions:

1. What is an import? Name some products that the U.S. imports.
2. What is an export? Name some products that the U.S. exports and some that Illinois exports.
3. How does Illinois rank in exporting of its agricultural products?

Related Activities:

1. This lesson could also be geared to purchases the students make. Most labels tell the origin. They could check their clothes and other belongings to see how many articles are imported.
2. Plot the origin of clothing materials on a map after looking at the tags.

To be used with:
Illinois and U.S. Agricultural Exports Name ____________________________

Illinois and U.S. Exports

Use the **Export Map** to answer the questions below.

1. How many countries buy each of these agricultural products from the United States?

Wheat:___________________________ Beef:___________________________

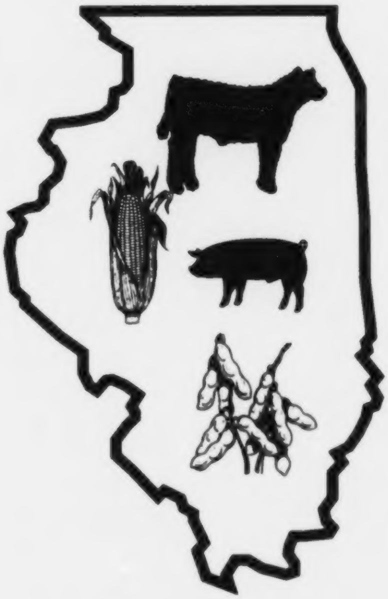
Feed Grains:______________________ Pork:___________________________

Soybeans & Soy Products:___________________________

2. The total U.S. agricultural export sales in 1998 was $53.7 billion. Illinois agricultural exports were $3.09 billion. What percent of the total United States agricultural exports did Illinois sell?

3. The total U.S. export sales for soybeans and products was $9 billion. Illinois exports 15.6% of these soybeans. How much was Illinois' share?

4. The U.S. exported $53.7 billion in 1998 and imported $37 billion in agricultural products. What would the trade surplus be? Is this good or bad?



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Illinois and U.S. Exports

Use the **Export Map** to answer the questions below.

1. How many countries buy each of these agricultural products from the United States?

Wheat: **8**

Beef: **7**

Feed Grains: **8**

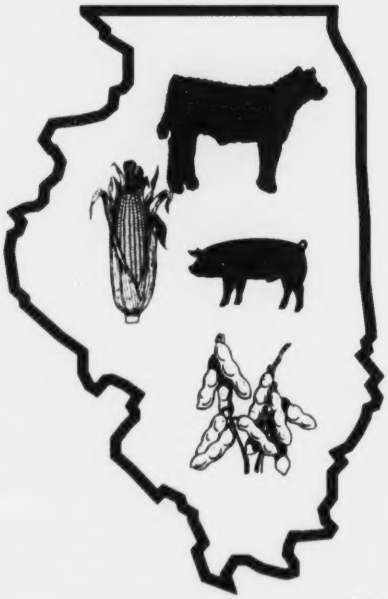
Pork: **4**

Soybeans & Soy Products: **7**

2. The total U.S. agricultural export sales in 1998 was $53.7 billion. Illinois agricultural exports were $3.09 billion. What percent of the total United States agricultural exports did Illinois sell? ***(3.09 ÷ 53.7) x 100 = 5.75%***

3. The total U.S. export sales for soybeans and products was $9 billion. Illinois exports 15.6% of these soybeans. How much was Illinois' share? ***9 x .156 = $1.4 billion***

4. The U.S. exported $53.7 billion in 1998 and imported $37 billion in agricultural products. What would the trade surplus be? Is this good or bad? ***$16.7 billion surplus: good***



To be used with:
Illinois and U.S. Agricultural Exports

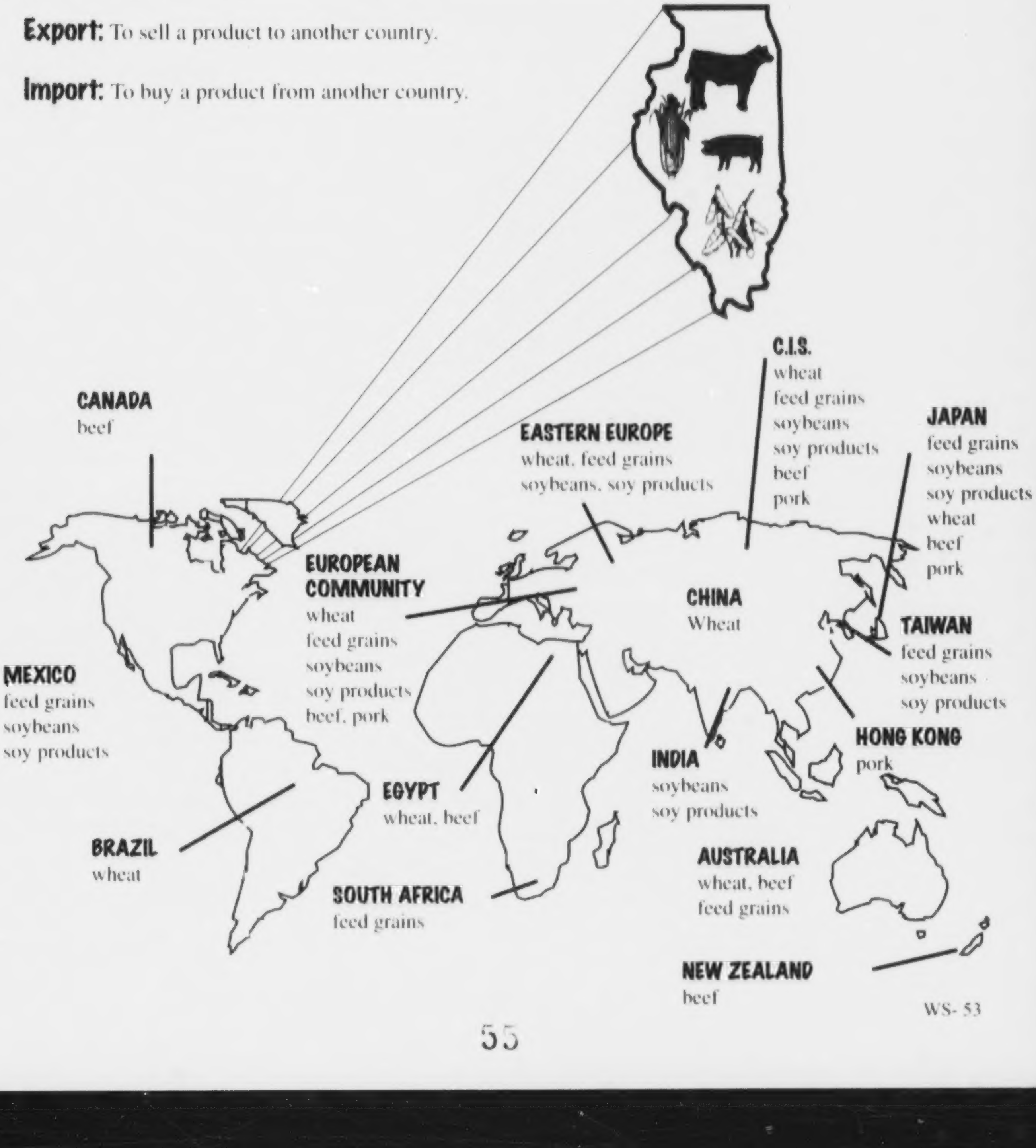
Name ______________________________

Export Map

Illinois has an important role in supplying food and farm products to countries all over the world. As of 1997, Illinois ranked #3 in the United States in the amount of agricultural products we send overseas. This map shows some of the countries all over the world that buy agricultural products from the United States. Some of the agricultural products were produced in Illinois.

Export: To sell a product to another country.

Import: To buy a product from another country.


CANADA
beef
EASTERN EUROPE
wheat, feed grains
soybeans, soy products
C.I.S.
wheat
feed grains
soybeans
soy products
beef
pork
JAPAN
feed grains
soybeans
soy products
wheat
beef
pork
EUROPEAN COMMUNITY
wheat
feed grains
soybeans
soy products
beef, pork
CHINA
Wheat
TAIWAN
feed grains
soybeans
soy products
MEXICO
feed grains
soybeans
soy products
HONG KONG
pork
INDIA
soybeans
soy products
EGYPT
wheat, beef
BRAZIL
wheat
AUSTRALIA
wheat, beef
feed grains
SOUTH AFRICA
feed grains
NEW ZEALAND
beef

Count On An Ag Career

Grade Level: 4-6

Approximate Length of Activity: One to two class periods

Objectives:

Teacher:

Provide facts about agricultural careers to utilize in developing statistics.

Students:

1. Survey their own parents or guardians and determine if they have the average amount of agriculture-related jobs.
2. Become aware of the many different types of jobs that are agriculture-related.

Illinois Learning Standards: 6.D.2; 10.B.2a

Introduction:

You don't have to come from a farm to pursue a position in agriculture. There are ag-related jobs everywhere for anyone! In fact, one out of every six jobs in the United States is related to agriculture. With over 250 career areas available in the field of agriculture the possibilities are numerous. Plus, there is a demand for qualified people to fill these positions. According to the United States Department of Agriculture, more than 57,000 jobs open each year in agriculture.

More than 22 million people have careers in agriculture. Only two million people are traditional farmers, but many people are involved in the process from farm to market. There are agriculture careers in agribusiness, communications, engineering, biotechnology research, government, education, computer science, processing, distribution, marketing, and many other areas. Some people have careers connected to agriculture but they do not realize it! For example, sales representatives for food distributors, genetic researchers, and elementary teachers who teach topics such as plant and animal systems are all involved in agriculture because their jobs relate to the food and fiber system.

The agricultural industry is made up of six employment areas. These areas are:

Production Specialists - 7%
Social Service Professionals - 9%
Education and Communication - 11%
Managers and Financial Specialists - 13%
Scientists, Engineers, and Related Specialists - 32%
Marketing, Merchandising, and Representatives - 28%

Agricultural Production Specialists consist of careers such as aquaculturalist, turf producer, viticulturist, rancher, farm manager, grain and/or livestock farmer, wildlife manager, greenhouse manager, fruit and vegetable grower, and specialty animal producer.

Social Service Professionals consist of careers such as career counselor, youth program director, dietitian, regulatory agent, community development specialist, regional planner, park manager, food inspector, and outdoor recreation specialist.

Communication and Education Specialists consist of careers such as computer systems analyst, illustrator, journalist, information specialist, personnel development specialist, agriculture/horticulture teacher, public relations representative, computer software designer, and radio/television broadcaster.

Managers and Financial Specialists include careers such as an accountant, policy analyst, bankers, food service manager, retail manager, consultant, wholesale manager, economist, insurance agency manager, and association manager.

Scientist, Engineers, and Related Specialists include careers such as agronomist, remote sensing specialist, research technician, environmental scientist, landscape architect, food scientist, animal scientist, agricultural engineer, water quality specialist, and plant scientist.

Marketing, Merchandising, and Sales Representatives include careers such as grain merchandiser, insurance agent, sales representative, landscape contractor, restaurant manager, market analyst, commodity broker, export sales manager, advertising manager, and forest products merchandiser.

Materials Needed:

- "Careers in Agriculture" worksheet
- Dictionaries, encyclopedias, and other resources
- Chalkboard and chalk or dry erase board and markers

Activity Outline:

1. Begin the lesson by having the class brainstorm a list of careers and jobs related to agriculture. The teacher should write these careers and jobs in a list on the board. When the students cannot think of any more careers or jobs, pass out the "Careers in Agriculture" worksheet. Have the students read through the occupations and then place each occupation in the appropriate category. This worksheet can be done individually or in groups.
2. Next, have the students write down their parents' or guardians' occupations. If some students are unsure, finish the lesson the next day so students can find out what their parents do.
3. The teacher should make two columns on the chalkboard. One column is for parents with jobs related to agriculture and the other column is for parents that have non-agriculturally related jobs. Ask each student what his or her parents do and whether their jobs are ag-related or not. If the student has trouble figuring out if a job is ag-related, have the class help.

4. Once the lists are complete, have the students count how many of their parents have occupations and how many occupations are related to agriculture. This can then be turned into a percentage and a ratio of how many parents are involved in agriculturally-related careers. Then compare this ratio to the fact the one in every six jobs in the U.S. is related to agriculture.

Discussion Questions:

1. What are some of the six employment areas of agriculture?
2. One in every how many jobs is related to agriculture?
3. How many parents/guardians have agriculturally-related jobs? What is the percentage? The ratio?
4. What are some jobs that are related to agriculture?
5. What job would you like to have that is related to agriculture?

Related Activities:

1. Have people in agriculture-related occupations come in and talk to your class.
2. Role-play some of these careers.
3. Categorize and graph your students' parents' occupations.

Name ______________________________

Careers in Agriculture

Careers related to agriculture are found in many different categories. Match each occupation below with the proper category. Can you think of other occupations in each category?

1. Farming and Ranching

   ____

2. Science and Research

   ____

3. Manufacturing

   ____

4. Business

   ____

5. Education and Services

   ____

6. Communications

   ____

a. Agronomist
b. Home Economist
c. Meteorologist
d. Food Inspector
e. Elevator Manager
f. Fruit Grower
g. County Extension Agent
h. Writer
i. Fertilizer Packager
j. Loan Officer
k. Soil Conservationist
l. Artist
m. Seed Grower
n. Poultry Producer
o. Equipment Sales Agent

Careers in Agriculture

Careers related to agriculture are found in many different categories. Match each occupation below with the proper category. Can you think of other occupations in each category?

1. Farming and Ranching
   f, m, n
2. Science and Research
   a, c, d, k
3. Manufacturing
   i, o
4. Business
   e, j
5. Education and Services
   b, g
6. Communications
   h, l

a. Agronomist
b. Home Economist
c. Meteorologist
d. Food Inspector
e. Elevator Manager
f. Fruit Grower
g. County Extension Agent
h. Writer
i. Fertilizer Packager
j. Loan Officer
k. Soil Conservationist
l. Artist
m. Seed Grower
n. Poultry Producer
o. Equipment Sales Agent

It All Adds Up to the Versatile Pig

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

1. Provide students with an opportunity to develop math skills through word problems.
2. Help the students learn what products pigs provide and how pigs are important to us.

Students:

1. Build mental math skills by solving word problems.
2. Learn how pigs play an important role in the daily lives of many people.

Illinois Learning Standards: 6.B.2; 6.C.2a; 7.A.2b; 12.A.2a; 12.B.2a; 13.B.2c

Introduction:

The pig was among the first animals to be domesticated, as early as 7000 B.C. Hernando DeSoto, an explorer, brought the first pigs to America in 1539. Today, pigs are raised across the United States and in almost every other country in the world.

Producers raise pigs today that weigh more, grow more efficiently, and yield more lean meat than ever before. Bacon, pork sausage, pork chops, and ham all come from pigs, but there are about 500 different by-products of pigs as well. Some examples of by-products are fertilizers, glass, china, floor wax, chalk, crayons, and medicine.

Sows, which are female pigs, give birth to litters of piglets twice a year. Each litter usually has seven to 10 piglets. Giving birth to piglets is also called farrowing. Some pork producers have "farrow to finish" farms, which means the pigs are bred, born, and fed on the farm until they are taken to market. Pigs are weaned from their mother when they are two to four weeks old. Farmers feed their pigs a well balanced diet twice a day. Pigs eat ground-up corn, soybeans, wheat, and grain sorghum. They are usually taken to market when they weigh 220-260 pounds. By this time, they are about five to six months old.

Pigs are also very important to society for the life-supporting and life-saving products we derive from them. Pigs provide a source of nearly 40 drugs and pharmaceuticals. Pigs are very much like humans because their heart and other organs work the same way. This is very beneficial to us because if a certain medication helps pigs, then chances are it will also help humans. Insulin from pigs is important because its chemical structure most nearly resembles that of humans. Pig skin is used in treating massive burns and injuries, and in healing persistent skin ulcers because the skin is similar to ours. Heart valves from pigs are surgically implanted in humans to replace human heart valves that are weakened due to disease or injury.

Materials Needed:

- "A Pig Grows Up" worksheet
- "Pig By-Products Math" worksheet
- Scratch paper

Activity Outline:

1. Discuss the information from the introduction with your students. Make sure they understand that we derive more products from pigs than just meat.
2. Hand out "A Pig Grows Up" worksheet to each student. Have the students answer the questions individually or in groups. The students may need to use scratch paper for multiplication and division problems.
3. Go over the answers of "A Pig Grows Up" worksheet with the students. If a student gets a wrong answer, go through the steps of the problem with them so they understand the right way to do the problem.
4. Next have the students do the "Pig By-Products Math" worksheet. They may need scratch paper again. When the students are finished, read through each sentence so the students can check and see if they have the right answers.

Discussion Questions:

1. Where are pigs raised?
2. What kinds of meat come from pigs?
3. What is a piglet?
4. What do pigs eat?
5. How long does it usually take for a pig to reach market weight?
6. In what ways are pigs beneficial to humans?

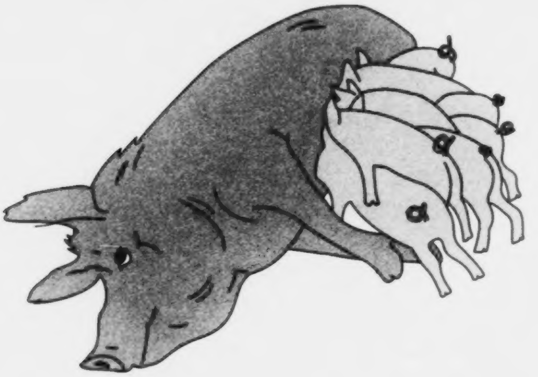
Related Activities:

1. Use *Ag Mag* 7 by Illinois Farm Bureau® to teach students about animals and animal care. Contact your county Farm Bureau® to learn how to obtain copies for your classroom.
2. Research pigs and find out more about their useful by-products.
3. Have the class read *Charlotte's Web* and compare Wilbur to a real pig.
4. Visit a pig farm and have a day of math activities such as finding perimeters of a field, garden, pig housing, estimating the weight of a pig, the amount a silo or storage bin holds, etc.
5. Hold a Pig Fest and have students bring in foods or products made from pigs.
6. Call your county Farm Bureau® to assist in bringing a pig farmer into your classroom. Let him or her talk about their pig operation and all they do to care for the pigs.
7. Check out the National Pork Producers Council's Web site at www.nppc.org to find out more about food and nutrition information and food fun for kids.

To be used with:
It All Adds Up to the Versatile Pig Name ______________________________

A Pig Grows Up

A piglet usually feeds from its mother until it is four to six weeks old and weighs about 25 pounds. Then it begins to eat feed grain and is known as a feeder pig. It takes about six months for a pig to reach market weight of 250 pounds.



1. After a pig stops feeding from its mother, how many pounds does it have to gain to be ready for market? __________ lbs.

2. Once a pig starts eating feed grains, how many bushels of feed must a pig eat to reach market weight? (Count them in the picture.) __________ bushels

3. Each bushel contains about 58 pounds of feed. How many pounds of feed does the pig eat? __________ lbs.

4. About 120 pounds of the feed that each pig eats is protein and mineral supplements. How much of the feed is corn? __________ lbs.

5. What percent of the total feed is made up of corn? (Round to the nearest whole number.) __________ %

6. How many piglets are usually in a litter? (Count them in the picture.) __________ piglets

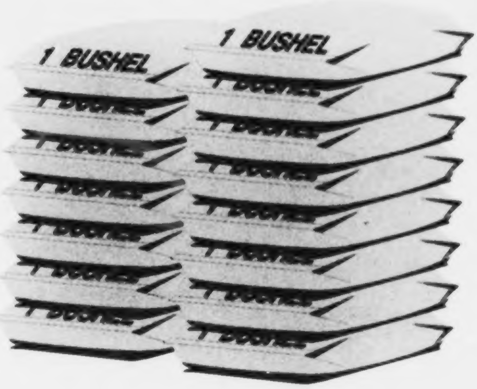
7. How many bushels of feed will the farmer need to raise all the pigs? __________ bushels

8. How many pounds of corn will all eight pigs eat? __________ lbs.

9. If all of the pigs were at the average market weight when they were sold, what was the total weight of all eight pigs? __________ lbs.

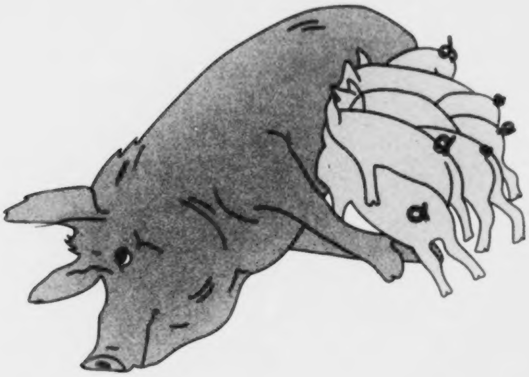
10. If the farmer sold the pigs for 40 cents per pound, how much money was paid for all of the pigs? $__________

11. How much was one pig worth? $__________



A Pig Grows Up

A piglet usually feeds from its mother until it is four to six weeks old and weighs about 25 pounds. Then it begins to eat feed grain and is known as a feeder pig. It takes about six months for a pig to reach market weight of 250 pounds.



1. After a pig stops feeding from its mother, how many pounds does it have to gain to be ready for market? **225 lbs.**

2. Once a pig starts eating feed grains, how many bushels of feed must a pig eat to reach market weight? (Count them in the picture.) **15 bushels**

3. Each bushel contains about 58 pounds of feed. How many pounds of feed does the pig eat? **870 lbs.**

4. About 120 pounds of the feed that each pig eats is protein and mineral supplements. How much of the feed is corn? **750 lbs.**

5. What percent of the total feed is made up of corn? (Round to the nearest whole number.) **86 %**

6. How many piglets are usually in a litter? (Count them in the picture.) **8 piglets**

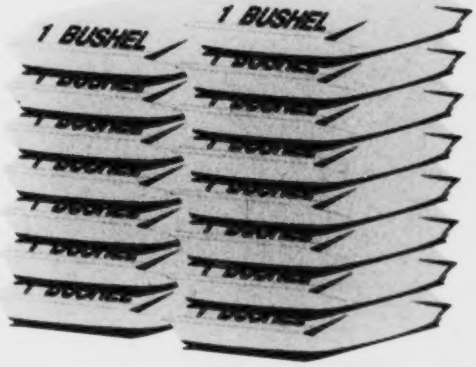
7. How many bushels of feed will the farmer need to raise all the pigs? **120 bushels**

8. How many pounds of corn will all eight pigs eat? **6000 lbs.**

9. If all of the pigs were at the average market weight when they were sold, what was the total weight of all eight pigs? **2000 lbs.**

10. If the farmer sold the pigs for 40 cents per pound, how much money was paid for all of the pigs? **$800**

11. How much was one pig worth? **$100**



To be used with:
It All Adds Up to the Versatile Pig Name ______________________________

Pig By-Products Math

Pigs are raised mainly for meat. Other parts of the pig's body are used to manufacture items, which are called by-products. To discover more about these by-products, fill in the blank words by doing the math problems and using the answer code to fill in the letters.

41	40	19	47	43	17	75	16	33	54	48	30	37	77
Q	**P**	**V**	**O**	**U**	**W**	**Y**	**B**	**A**	**D**	**F**	**G**	**H**	**C**

53	56	67	18	39	25	27	49	81	36	13	23
J	**K**	**N**	**R**	**L**	**M**	**E**	**S**	**I**	**T**	**Z**	**X**

1. Bones and skin from the pig are used to make gelatin and ______ ______ ______ ______
(6x7)-12 (3x9)+12 (8x3)+19 (3x6)+9

2. Glycerine is used in making lipstick and ______ ______ ______ ______ ______ ______ ______
(8x8)+13 (2x18)-18 (8x6)-15 12+(9x7) (7x8)-9 (9x9)-14 19+(6x5)

3. Glass and fertilizer can be produced from______ ______ ______ ______ ______ ______ ______ ______
(4x8)-16 18+29 (9x6)+13 (2x13)+1 50-(5x5) 35-8 (6x6)-3 (4x9)+3

4. Dried bones are used to make buttons and ______ ______ ______ ______ ______ dishes
5+(8x9) 54-17 (3x3)x9 (8x10)-13 (12x4)-15

5. Pig pancreas glands are a source of insulin, which is used to treat

______ ______ ______ ______ ______ ______ ______ ______
5+(7x7) (8x9)+9 (10x3)+3 4+(4x3) (60+3)+7 (9x2)x2 (15x2)-3 (7x1)x7

6. Because it is like human skin, pig skin is used in treating ______ ______ ______ ______ ______
32-16 3+(5x8) 25-7 (9x8)-5 (8x8)-15

7. Pigs can help humans who have growth problems though the use of their

______ ______ ______ ______ ______ ______ ______ ______.
(12x3)+1 55-8 30-(2x6) (5x3)+10 (8x8)-17 (33x2)+1 51-24 1+(12x4)

8. Pig heart valves have been implanted in human ______ ______ ______ ______ ______ ______
18x19 46-19 (13x3)-6 (6x6)-18 (90÷10)x4 (49-0)x1

Adapted from the Illinois Pork Producers Association, 6411 S. Sixth St., Springfield, IL 62707, (217) 529-3100.

To be used with:
It All Adds Up to the Versatile Pig **Answer Key**

Pig By-Products Math

Pigs are raised mainly for meat. Other parts of the pig's body are used to manufacture items, which are called by-products. To discover more about these by-products, fill in the blank words by doing the math problems and using the answer code to fill in the letters.

41	40	19	47	43	17	75	16	33	54	48	30	37	77
Q	**P**	**V**	**O**	**U**	**W**	**Y**	**B**	**A**	**D**	**F**	**G**	**H**	**C**

53	56	67	18	39	25	27	49	81	36	13	23
J	**K**	**N**	**R**	**L**	**M**	**E**	**S**	**I**	**T**	**Z**	**X**

1. Bones and skin from the pig are used to make gelatin and

g	**l**	**u**	**e**
(6x7)-12	(3x9)+12	(8x3)+19	(3x6)+9

2. Glycerine is used in making lipstick and

c	**r**	**a**	**y**	**o**	**n**	**s**
(8x8)+13	(2x18)-18	(8x6)-15	12+(9x7)	(7x8)-9	(9x9)-14	19+(6x5)

3. Glass and fertilizer can be produced from

b	**o**	**n**	**e**	**m**	**e**	**a**	**l**
(4x8)-16	18+29	(9x6)+13	(2x13)+1	50-(5x5)	35-8	(6x6)-3	(4x9)+3

4. Dried bones are used to make buttons and

c	**h**	**i**	**n**	**a**
5+(8x9)	54-17	(3x3)x9	(8x10)-13	(12x4)-15

dishes

5. Pig pancreas glands are a source of insulin, which is used to treat

d	**i**	**a**	**b**	**e**	**t**	**e**	**s**
5+(7x7)	(8x9)+9	(10x3)+3	4+(4x3)	(60÷3)+7	(9x2)x2	(15x2)-3	(7x1)x7

6. Because it is like human skin, pig skin is used in treating

b	**u**	**r**	**n**	**s**
32-16	3+(5x8)	25-7	(9x8)-5	(8x8)-15

7. Pigs can help humans who have growth problems though the use of their

h	**o**	**r**	**m**	**o**	**n**	**e**	**s**
(12x3)+1	55-8	30-(2x6)	(5x3)+10	(8x8)-17	(33x2)+1	51-24	1+(12x4)

.

8. Pig heart valves have been implanted in human

h	**e**	**a**	**r**	**t**	**s**
18x19	46-19	(13x3)-6	(6x6)-18	(90÷10)x4	(49-0)x1

Adapted from the Illinois Pork Producers Association, 6411 S. Sixth St., Springfield, IL 62707, (217) 529-3100.

Layer Away

Grade Level: 4-6

Approximate Length of Activity: Two class periods (one per day)

Objectives:

Teacher:

1. Help the students understand the importance of soil.
2. Teach the students the components of soil and the characteristics of the components.
3. Explain to the students why it is important for farmers to test their soil.

Students:

1. Learn why soil is important and why we should take good care of it.
2. Understand that there are many components of soil.
3. Be able to explain the different characteristics of each component.
4. Understand why farmers need to test their soil.

Illinois Learning Standards: 6.B.2; 6.C.2a; 6.C.2b; 6.D.2; 7.A.2a; 10.A.2a; 10.B.2b; 10.B.2d; 11.A.2b; 11.A.2c; 11.A.2d; 12.B.2a; 12.E.2a; 17.A.2a; 17.B.2a

Introduction:

One of the most important natural resources that covers much of the earth's land surface is soil. Most life on earth depends upon the soil as a direct or indirect source of food. Plants are rooted in the soil and obtain nutrients (nourishing substances) from it. Animals also get nutrients from eating the plants in the soil. Soil is home to many organisms such as seeds, spores, insects, and worms. The contents of soil change constantly, and there are many different kinds of soil. It forms very slowly and is destroyed easily, so it must be conserved in order to continue to support life.

Soil is made up of four parts: air, water, minerals, and organic matter. Air and water provide nutrients to plants so they can make food for themselves. Organic matter, also known as humus, is made of plant and animal remains in various stages of decay. Minerals are the clay, sand, and silt particles. The mineral content determines the soil type. Sandy soil has mostly sand and no organic matter. Sand is the largest of the soil particles, feels gritty, is the heaviest, and allows water and air to move easily through it. Clay soil has mostly clay, a little organic matter, and sand. Clay particles are very fine and are the smallest of the three soil particles. Clay is sticky when wet and hard and brick-like when dry. Silt is the soil particle that falls between sand and clay in texture. It is considered a medium-size soil particle. It feels like flour and is very smooth when you rub it in your hands. Silt particles keep the soil rich and loose.

Farmers have very important jobs growing the food and fiber for the world. If we did not have farmers, we would have to grow our own food and materials for clothing. However, a farmer's job consists of many more responsibilities than growing food or fiber. They must also take good care of our soil so we can continue to grow enough food to feed everyone. Soil testing must be done so the farmer knows what type of soil he or she has and can make sure the proper nutrients and amounts of these nutrients are present. If the proper nutrients aren't present, the levels of these nutrients need to be adjusted so the farmer can grow a healthy crop. By adding fertilizers and rotating crops, farmers replace nutrients that leaching and growing plants have removed. Farmers also make sure there is a high level of organic matter in cultivated soils.

Materials Needed:

- "Soil Texture Triangle" handout
- "Soil Composition" worksheet
- "Soil Triangle" worksheet
- Clear quart size or gallon size jar with lid (1 per group)
- Soil sample (1 per group)
- Ruler (1 per group)
- Water
- Containers to get water (if needed)
- Paper
- Tape
- Chalkboard and chalk

Activity Outline:

Prior to this lesson have the students form groups with three to four students in each group. Have one of the students bring a soil sample in a jar with a lid or a resealable plastic bag. The soil sample needs to be enough to fill a quart size jar or gallon size jar (whichever you choose) about half way. Make sure the students understand their soil sample needs to come from their yard or garden. They should not bring in a container of potting soil.

Day One:

1. Write the four components of soil on the chalkboard for the class to see. Discuss each component with the class. When discussing minerals, write sand, silt, and clay on the board. Discuss the characteristics of each type and write the characteristics on the board.
2. Explain to the students that farmers have many responsibilities with their job. One of these responsibilities is to maintain the quality of their farmland. Farmers test their soil to determine what type of soil they have and what nutrients are in the soil. The

soil test also tells farmers if any nutrients need to be added.

3. Divide the class into groups of three to four students each (if not done previously). Hand out a quart size or gallon size clear jar with a lid to each group.
4. Have the groups pour their soil sample into their clear jar until the jar is half full. Then have each group fill their jar three-fourths full of water. Place the lid tightly on the jar.
5. Have the students in each group take turns shaking their jar for one minute each.
6. When done shaking, have the groups put their names on a piece of paper and tape it to their jar. Set all of the jars out of the way where they will not be disturbed.

Day Two:

1. Start the second part of this lesson by asking students why they think you had them put water in the jar with the soil and shake it up. Let students make some guesses.
2. When the students are done guessing, explain to them that all of the soil samples put into the jars were soil that was all mixed up. Each sample has different amounts of minerals (sand, silt, and clay) in it, but we did not know the amounts by simply looking at the soil. By putting water in with the soil, shaking the jar, and letting the soil settle, we are able to see the different types of minerals in the soil. This occurs because the heaviest particles (sand) settle first on the bottom of the jar. The next layer of soil is the silt because it has medium size particles. Silt is not as heavy as sand but is heavier than clay. The last layer to settle on the top is the clay. Clay particles are the lightest of all.
3. Have the students get back into their groups and get their jar of soil. Remind them to carefully carry their jar back to their group so the particles will not be disturbed. Hand out the "Soil Composition" worksheet and the "Soil Triangle" worksheet to each student. The "Soil Texture Triangle" handout can also be passed out to each group or can be made into an overhead for all to see.
4. Next the groups should conduct the measurement on their "Soil Composition" worksheet. Have the groups use their ruler to measure the total height of the soil in their jar. Record this number in centimeters on the worksheet.
5. Then have the students measure the heights of the sand, the silt, and then the clay. Record these numbers on the worksheet.
6. Now the students will change their measurement into percentages. The students should then compute what percentage of sand is in the sample, what percentage of silt is present, and what percentage of clay is present.
7. When the students complete this worksheet, have them follow the directions on the "Soil Triangle" worksheet. The students will need to use their percentages figured on the "Soil Composition" worksheet to complete the "Soil Triangle" worksheet.
8. The "Soil Triangle" worksheet will tell the students what type of soil their group has.

Discussion Questions:

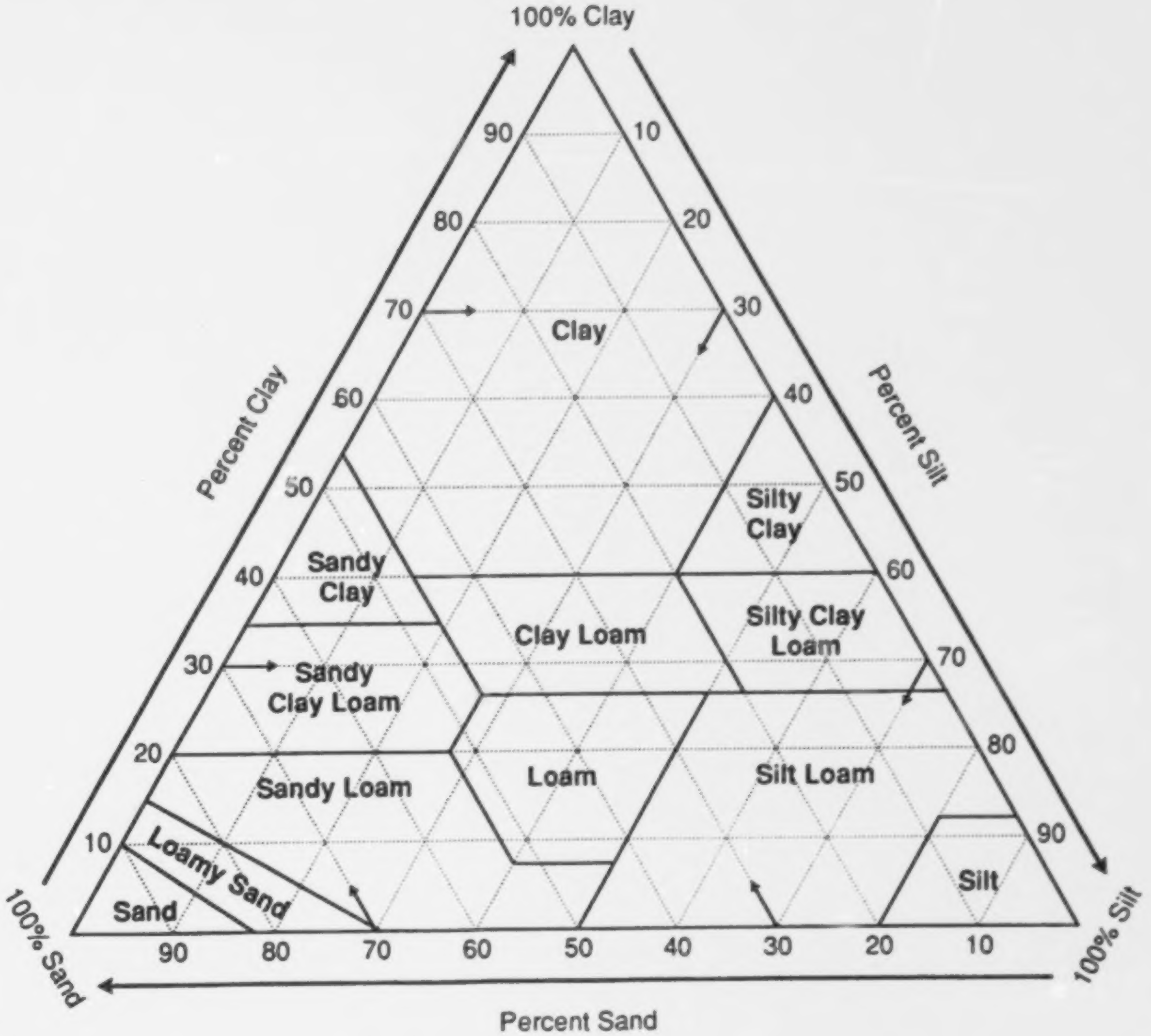
1. Why is soil important?
2. What are the components of soil?
3. What are the three types of minerals in soil?
4. How are these three minerals different?
5. Why do farmers test their soil?
6. What type of soil settled first in your jar? Second? Third?
7. What type of soil did your group have?

Related Activities:

1. Have the class keep track of where each soil sample came from and compare what types of soil they are.
2. Invite a farmer into the classroom to discuss what he or she does to protect their farmland from soil erosion.
3. Have a conservationist come to the classroom to talk more about soil and its importance.

To be used with:
Layer Away

Soil Texture Triangle


100% Clay
Percent Clay
Percent Silt
Percent Sand
100% Sand
100% Silt
90
80
70
60
50
40
30
20
10
10
20
30
40
50
60
70
80
90
90
80
70
60
50
40
30
20
10
Clay
Silty Clay
Sandy Clay
Clay Loam
Silty Clay Loam
Sandy Clay Loam
Sandy Loam
Loam
Silt Loam
Loamy Sand
Sand
Silt

To be used with:
Layer Away

Name ______________________________

Soil Composition

Conduct the following measurements to find out what type of soil you have. Record all heights in centimeters.

1. Measure the total height (amount of the soil in your jar). Total Height: _______ cm
2. Measure the amount of sand (bottom layer). Sand: _______ cm
3. Measure the amount of silt (second layer). Silt: _______ cm
4. Measure the amount of clay (the top layer). Clay: _______ cm

Now take the measurements for the sand, silt, and clay and turn them into percentages. The percentages will tell you how much sand, silt, or clay is present compared to the total amount of soil in the jar. To figure out the percentages of each, take your amount of sand (or silt or clay) and divide the number by the total amount of soil in the jar. Then multiply this number by 100 to get the percentage of sand in your jar. Round your percentages to the nearest whole number.

Here is an example:

You have 2.5 cm of sand in your jar. The total amount of soil in your jar is 7 cm.

Step 1: Divide the amount of sand by the amount of soil.
2.5 cm ÷ 7 cm = .357
Step 2: Multiply the number by 100 to figure the percent.
.357 x 100 = 35.7
Step 3: Round your answer.
35.7 Rounded = 36% Sand

5. Sand: _______ cm
cm = _______ x 100 = _______ % Sand = _______ %
6. Silt: _______ cm
cm = _______ x 100 = _______ % Silt = _______ %
7. Clay: _______ cm
cm = _______ x 100 = _______ % Clay = _______ %

8. Now add your three percentages together. They should equal 100%.
_______ % Sand + _______ % Silt + _______ % Clay = _______ %

To be used with:
Layer Away

Name ______________________________

Soil Triangle

Use the **Soil Texture Triangle** to determine what type of soil your group has. Look over the soil triangle to familiarize yourself with it. The bottom line represents the percentages for sand. The slanting left line represents the percentages for clay and the right slanting line represents percentages for silt.

1. Transfer your percentages of sand, silt, and clay from the "Soil Composition" worksheet.

   Sand: _______ %   Silt: _______ %   Clay: _______ %

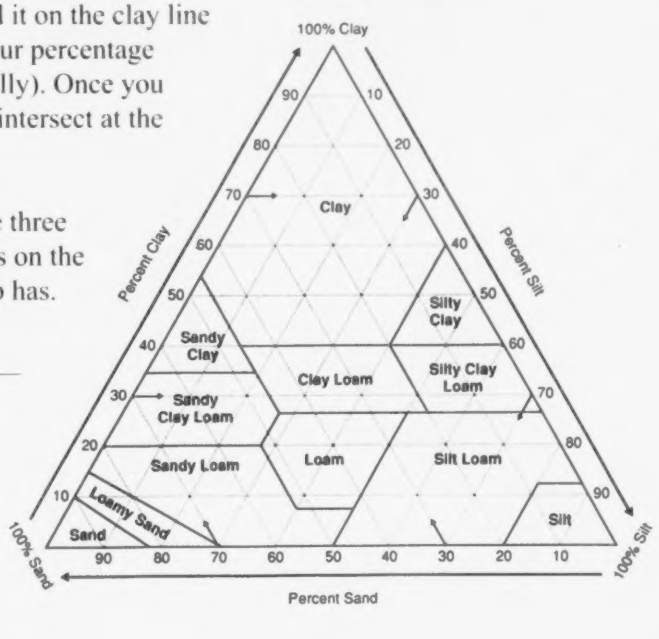
2. Take your percentage for sand and find it on the sand line (bottom line). From this point, draw a line upwards and to the left through the triangle. (This line should be parallel to the right slanting line.) This line marks your percentage amount for sand.

3. Next, take your percentage amount for silt and find it on the silt line (the right slanting line). From your percentage on the line, draw a line slanting downward and to the left, through the triangle. This represents your percentage amount for silt. (The sand line and the silt line should cross over one another.)

4. Now take your percentage for clay and find it on the clay line (the left slanting line). Draw a line from your percentage point directly across the triangle (horizontally). Once you have drawn this line, all three lines should intersect at the same point.

5. Draw a circle around the intersection of the three lines. It will fall within one of the soil types on the grid. This is the type of soil that your group has. The type of soil we have is:

   ____


100% Clay
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70
80
90
Percent Clay
Percent Silt
Clay
Silty Clay
Sandy Clay
Clay Loam
Silty Clay Loam
Sandy Clay Loam
Sandy Loam
Loam
Silt Loam
Loamy Sand
Sand
Silt
100% Sand
100% Silt
90
80
70
60
50
40
30
20
10
Percent Sand

Nuts About Peanuts!

Grade Level: 4-6

Approximate Length of Activity: One to two class periods

Objectives:

Teacher:

1. Observe the students' abilities to use a dictionary for definition of vocabulary words and labeling of a diagram.
2. Demonstrate the step-by-step instructions of planting a peanut.
3. Measure student understanding through discussion and worksheets.

Students:

1. Use a dictionary to define vocabulary words and label the words on a diagram.
2. Follow step-by-step instructions to plant a peanut.
3. Use a chart to record the growth of peanut plants.

Illinois Learning Standards: 11.A.2b; 11.A.2c; 11.A.2d; 11.A.2e; 12.A.2a; 13.A.2c

Introduction:

The "Father of the Peanut" –

George Washington Carver began his research into peanuts in 1903 at Tuskeegee Institute in Alabama. The talented botanist recognized the value of peanuts as a cash crop. He proposed to farmers that peanuts be planted as a rotation crop in their fields. Many farmers found this procedure especially valuable in the southeastern cotton growing areas when insects called boll weevils threatened the cotton crops. By listening to the great scientist, peanut production flourished. States growing peanuts today include Georgia, Texas, Alabama, North Carolina, Oklahoma, Virginia, Florida, South Carolina, and New Mexico. Georgia grows about 45 percent of all U.S. peanuts. Carver was able to discover over 300 uses for the peanut, including shaving cream, leather dye, coffee, ink, and shoe polish.

How the peanut plant grows –

Unlike other nuts, peanuts do not grow on trees. The peanut is unusual because it grows on a plant which flowers above the ground, but the actual fruits (the peanuts) grow underground. A farmer usually plants his peanuts in April or May. Once planted, peanut seeds grow into a green, oval-shaped leaf plant which reaches about 18 inches in height. From planting to harvesting, the growing cycle of a peanut takes four to five months.

Types of peanuts –

Although peanuts come in many varieties, there are four basic market types: Virginia-type, Runner, Spanish-type, and Valencia. Each of the peanut types is distinctive in size, flavor, and nutritional value.

Runner peanuts are known for their consistent, medium kernel size. Half of the Runner peanuts grown are used to make peanut butter. The rest are used in candy and snacks.

Virginia-type peanuts are known for their extra large kernel size. They account for most of the peanuts roasted and processed in the shell. When they are shelled, the larger kernels are sold as snack peanuts.

Peanuts known for their smaller kernels and reddish-brown skins are called Spanish-type peanuts. They are used in peanut butter, snack peanuts, and peanut candies. The Spanish-type peanuts also have a high oil content which is good when crushing for oil.

Valencia peanuts are known for having three or more small kernels to a shell and for their bright red skins. Valencia peanuts are very sweet and are usually roasted and sold in the shell.

Food for thought –

Dr. John Harvey Kellogg applied for the first patent for peanut butter in 1895. The world was introduced to peanut butter at the Universal Exposition in 1904 in St. Louis. The peanut treat sold for about six cents per pound. Both peanuts and peanut butter are protein powerhouses providing 12 percent of the Recommended Daily Allowance per serving. About one ounce of peanuts or two tablespoons of peanut butter make up one serving. Peanuts are also a good source of fiber. Fiber reduces the risk of some kinds of cancer and helps the digestive system eliminate waste from the body. In addition, peanuts contain mostly unsaturated fat, which is known as the "good fat."

Information from American Peanut Council's "No-Nut Peanut" a teachers kit for grades 3-5. Reprinted with permission from American Peanut Council.

Materials Needed:

- "Peanut Plant" worksheet
- "My Peanut Plant Growth" worksheet
- "Peanut Crossword Puzzle" worksheet
- Large, clear plastic cups
- Small, round plastic or paper plates
- Sand or sandy loam soil
- 3-5 peanuts (in the shell) per student
- Plastic spoons
- Permanent marker
- Paper towels
- Water
- Pen or pencil
- Several pots (12 inches in diameter) or a ten-gallon aquarium

Activity Outline:

1. Read aloud the information from the introduction to the students. Check student understanding by asking discussion questions.
2. Pass out the worksheet, "Peanut Plant" to students. As a group label the parts of the peanut plant.
3. Take the peanuts out of their shells and soak the raw peanuts overnight.
4. Have students follow these directions for planting peanut seeds. You may wish to demonstrate the steps as they follow along with their own cups.
    a. Get a cup. Write your name on it with a permanent marker.
    b. Make a small drainage hole in the bottom of your cup with a pen or pencil (with your teacher's help).
    c. Fill your cup with soil to within one inch of the top of the cup.
    d. Plant three to five peanuts about two inches deep in the soil. Press the soil firmly, but do not pack.
    e. Fold a paper towel into a square and moisten with water. Place the paper towel under the plastic cup.
    f. Then place your paper towel and cup on a paper or plastic plate.
    g. Place the cup and plate in a warm spot on a window sill.
    h. Record observations daily on "My Peanut Plant Growth" worksheet.
5. Keep plants in a warm room and expose them to as much direct sunlight as possible.
6. In two to three weeks, the plants should sprout. About two weeks after sprouting, transplant a few of the plants so each is in a larger pot (about 12 inches in diameter) or put two plants in a 10-gallon aquarium. (The aquarium allows students to see the peanuts growing underground.) If you can, put a layer of rocks at the bottom of the aquarium to allow some drainage. Be careful not to overwater. Considering class space, you may want to send the plants home with students and only replant a few in the classroom for everyone to watch.
7. Blooms should appear on the plant approximately 45 days after the plant has emerged. Mark these days on a calendar for follow-up: 14 days—sprouts; 45 days—blooms; 90 days—peanuts.
8. Ask students to complete the "Peanut Crossword Puzzle." Go over the answers with students once they have completed it.

Discussion Questions:

1. How do peanuts grow? (on a plant out of the ground and not on a tree)
2. Describe what a peanut plant looks like. (green, oval-shaped leaf plant about 18 inches tall)
3. When does a farmer plant peanuts and how long is the growing cycle? (plants in April or May; growing cycle is four to five months)
4. Name some states that grow peanuts. (Georgia, Texas, Alabama, North Carolina, Oklahoma, Virginia, Florida, South Carolina, New Mexico)

5. Where did George Washington Carver study the peanut? (Tuskeegee Institute in Alabama)
6. What is the name of the insect that threatened the cotton crop? (boll weevil)
7. Why did farmers switch from cotton to peanuts? (Carver taught farmers that peanuts were a valuable cash crop that had many uses.)
8. About how many uses for the peanut did Carver find? (Over 300)
9. Name something Carver developed from peanuts. (Answers can include shaving cream, leather dye, coffee, ink, shoe polish)

Related Activities:

1. Have students enjoy peanut butter sandwiches or peanut butter and crackers while they are completing the activities. Use the following recipe to make homemade peanut butter.
   a. Measure 1 cup of peanuts and put in a blender.
   b. Measure 1 1/2 teaspoons peanut oil and put in blender.
   c. Cover and blend for approximately 3 minutes.
   d. Scrape sides of blender with a spoon and push peanuts to the bottom of the blender. Cover and blend for 3 more minutes.
   e. Scoop out of blender and enjoy on bread, crackers, or celery.
   f. Compare the homemade peanut butter to store brands.
2. For more information on peanut activities, contact: Virginia – Carolina Peanut Promotions, Education Services Department, P.O. Box 8, Nashville, NC 27856-0008, (252) 459-9977.

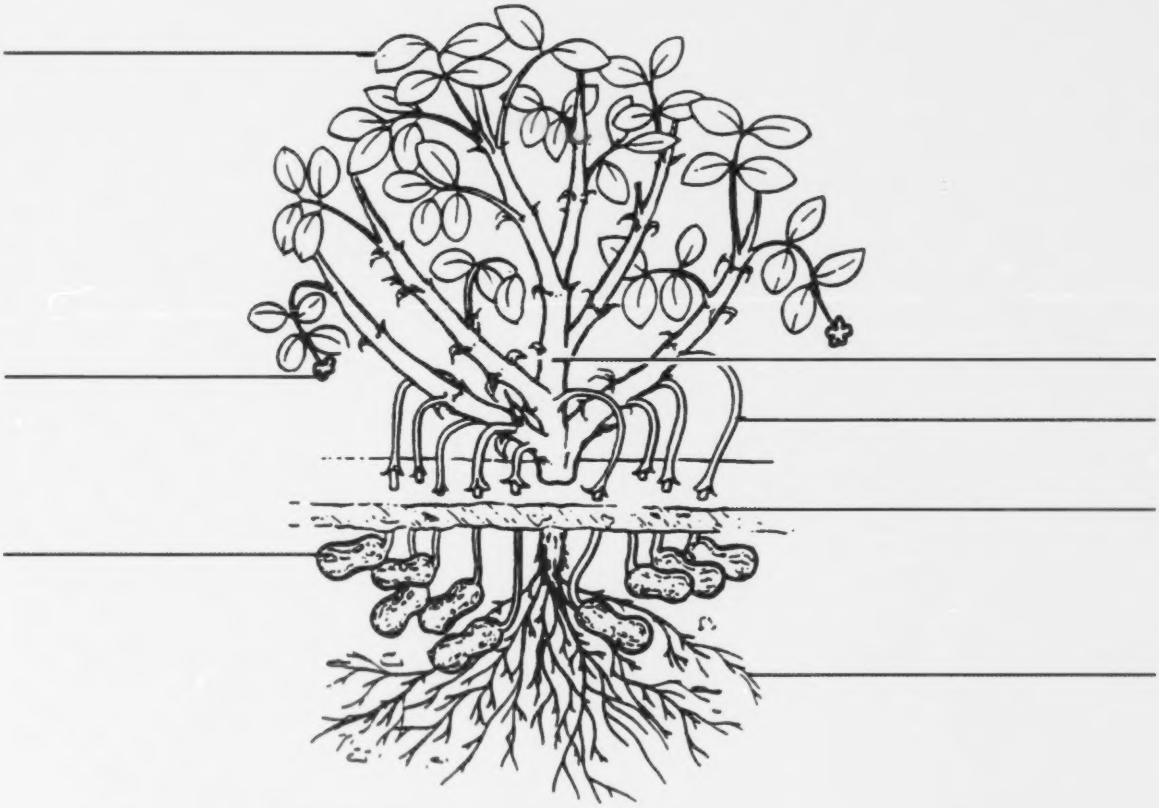
To be used with:
Nuts About Peanuts

Name ______________________________

Peanut Plant

Can you label the parts of the peanut plant below?

Root	**Peg**	**Bloom**
Peanut	**Ground**	**Stem**
	Leaf	



Adapted from the "No-Nut Peanut" Teacher's kit from the American Peanut Council.
WS- 76

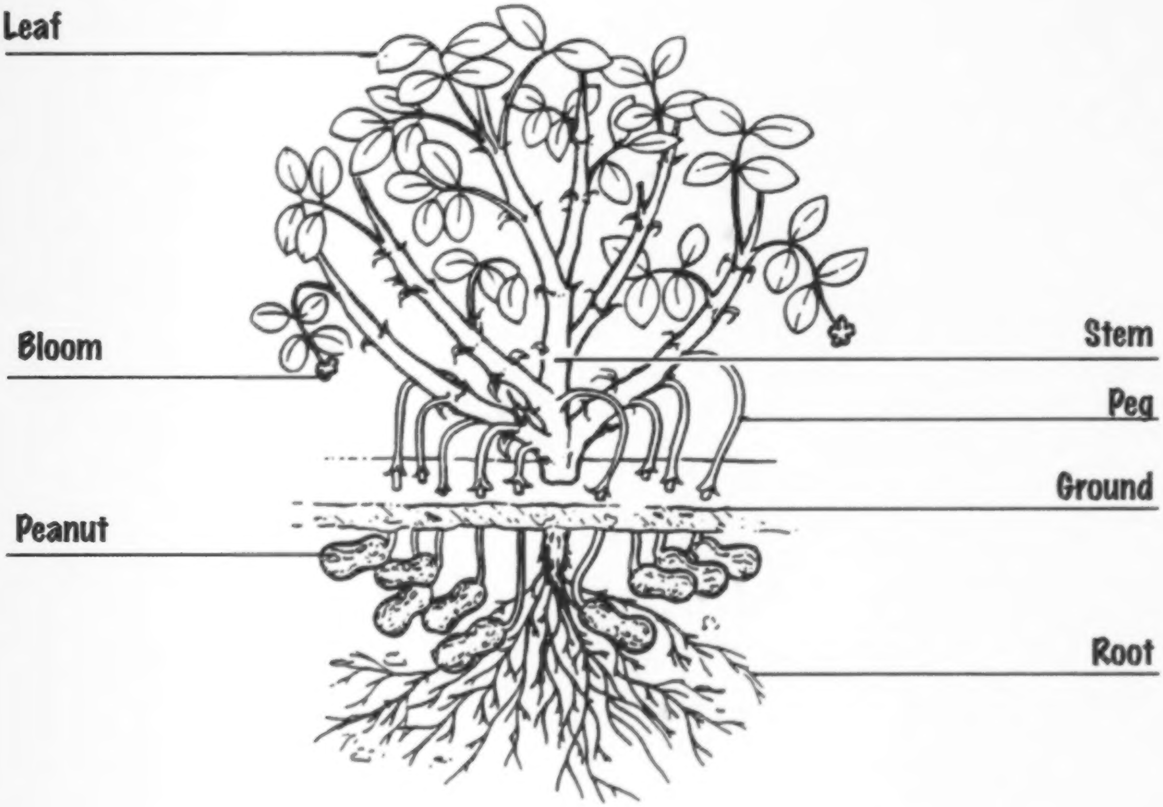
To be used with:
Nuts About Peanuts

Answer Key

Peanut Plant

Can you label the parts of the peanut plant below?

Root
Peanut
Peg
Ground
Leaf
Bloom
Stem

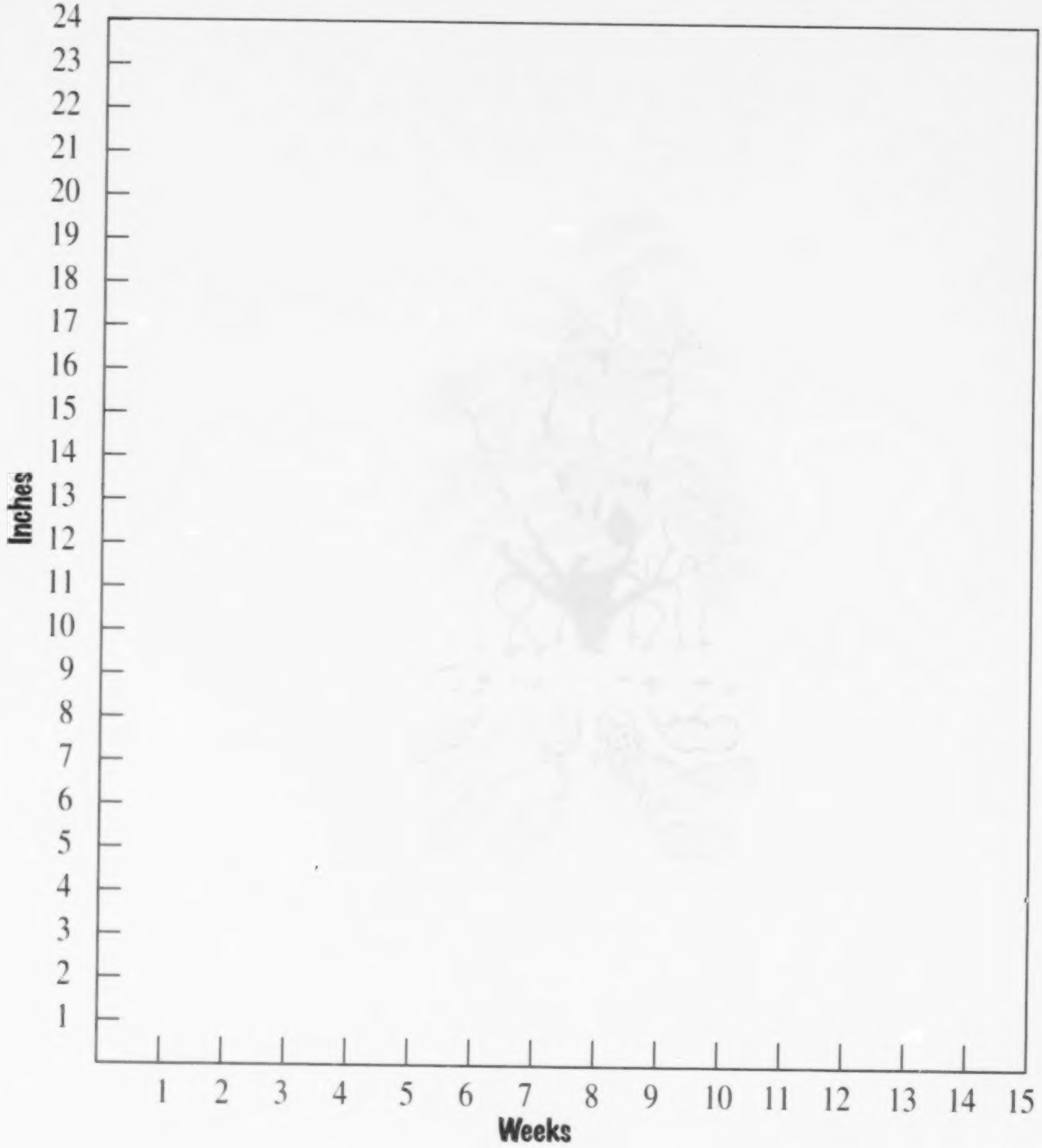

Leaf
Bloom
Peanut
Stem
Peg
Ground
Root

Adapted from the "No-Nut Peanut" Teacher's kit from the American Peanut Council.

To be used with:
Nuts About Peanuts

Name ______________________

My Peanut Plant Growth

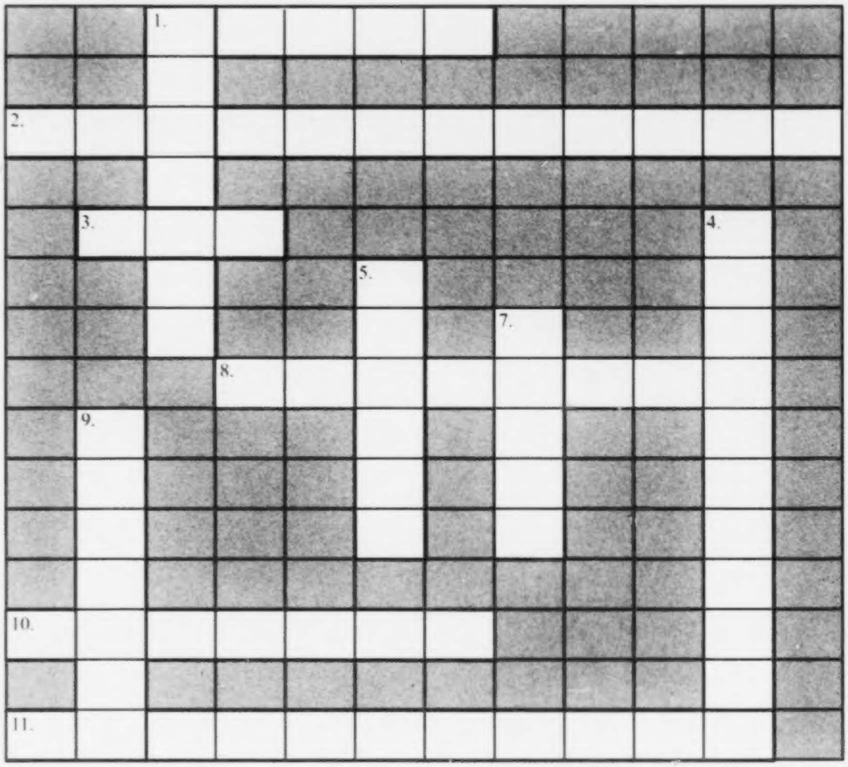


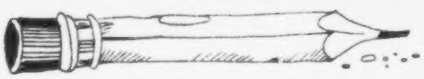
To be used with:
Nuts About Peanuts

Name ______________________________

Peanut Crossword Puzzle

Use what you have learned about peanuts to complete the crossword puzzle below.





Across
1. Valencia peanuts have a ______ taste.
2. Runner peanuts are used to make __________ _______.
3. Peanuts can be crushed to make ______.
8. _______ peanuts are know for their large kernel size and are often sold in the shell.
10. John Harvey ______ applied for the first patent for peanut butter.
11. Peanuts grow ________________.
puts them in the meat group.

Down
1. ___________ -type peanuts are known for their smaller kernels and their reddish-brown skins.
4. Peanuts contain mostly ______ fat - the "good" kind of fat.
5. Dr. George Washington _________ is known as the father of the peanut industry.
7. Peanuts are a good source of ___________ which helps the body eliminate waste.
9. Peanuts are high in ________ which

Adapted from "No-Nut Peanut" Teacher's Kit from the American Peanut Council.

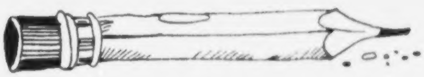
To be used with:
Nuts About Peanuts

Answer Key

Peanut Crossword Puzzle

Use what you have learned about peanuts to complete the crossword puzzle below.

		1. s	w	e	e	t					
		p									
2. p	e	a	n	u	t	b	u	t	t	e	r
		n									
	3. o	i	l							4. u	
		s			5. c					n	
		h			a		7. f			s	
			8. v	i	r	g	i	n	i	a	
	9. p				v		b			t	
	r				e		e			u	
	o				r		r			r	
	t									a	
10. k	e	l	l	o	g	g				t	
	i									e	
11. u	n	d	e	r	g	r	o	u	n	d	



Across
1. Valencia peanuts have a **SWEET** taste.
2. Runner peanuts are used to make **PEANUT BUTTER**.
3. Peanuts can be crushed to make **OIL**.
8. **VIRGINIA** peanuts are know for their large kernel size and are often sold in the shell.
10. John Harvey **KELLOGG** applied for the first patent for peanut butter.
11. Peanuts grow **UNDERGROUND**.

Down
1. **SPANISH** -type peanuts are known for their smaller kernels and their reddish-brown skins.
4. Peanuts contain mostly **UNSATURATED** fat - the "good" kind of fat.
5. Dr. George Washington **CARVER** is known as the father of the peanut industry.
7. Peanuts are a good source of **FIBER** which helps the body eliminate waste.
9. Peanuts are high in **PROTEIN** which puts them in the meat group.

Adapted from "No-Nut Peanut" Teacher's Kit from the American Peanut Council.

Dairy Delights!

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

1. Give students a general understanding of product technology and its importance to our food system over the years.
2. Explain why cheese-making is a technological process and assist the students in a cheese-making activity.

Students:

1. Describe the process of cheese-making from cow to store.
2. Gain a general understanding of product technology.
3. Relate the history of cheese-making to cheese-making today.

Illinois Learning Standards: 13.B.2a; 13.B.2b; 13.B.2c; 18.C.2

Introduction:

Cheese-making, one of the earliest forms of biotechnology, involves chemical reactions that cause curd formation from liquid milk. To make cheese, living organisms (bacteria and fungi) are added to the milk. During their growth, the organisms metabolize the curd to create chemical changes that result in cheeses of different textures and tastes, such as Swiss cheese and bleu cheese. The type of milk, amount of fat in the milk, coagulation methods, cutting, cooking, curd formation, and the amount of salt can determine the types of cheeses.

Production of cheese starts with a dairy cow. After giving birth, a dairy cow is able to produce milk. Dairy cows are milked two to three times a day and their milk travels from the milking machine to a cooling tank. A dairy plant sends a refrigerated truck to the dairy farm every day to transport the milk to a cheese factory or dairy plant. At the cheese factory, the milk is pumped into a storage silo and then tested to make sure it is clean and wholesome. After the milk is cooled, it is pumped into a stainless steel vat where starter cultures are added. The starter is stirred through the milk with mechanical paddles. Rennet, a liquid enzyme, is added to the milk as a thickener. After 30 minutes, curds form from the milk. Knives cut the curd into small cubes and a clear liquid called whey oozes from them. The cheese is placed on a finishing table and the whey drains from the curds. The curds knit into a solid mass as they rest. Next, the curds are cut and fed through a cheese mill. The mill cuts the curds again and puts them in a mixer with hot water. This causes the curds to melt so they can be placed in forms, or molds. The cheese forms and is placed in a salt brine bath to develop flavor. Finally, the cheese is wrapped and packaged.

Did you know that farmers discovered biotechnology thousands of years ago? About 8000 B.C., the first farmers decided to stay in one place and grow certain plants. Since then, people have continued to produce better, safer, and more food to support themselves and the world. Around 1800, people first used bacteria to create new and different foods. When bacteria grows in certain foods, such as cheese, it causes desirable flavors and textures. In 1845 a group of Swiss immigrants settled in Wisconsin and started manufacturing cheese. By 1880, there were 3,923 dairy factories in the United States that made 216 million pounds of cheese that year.

In the activity below, classrooms use an enzyme called chymosin to break bonds in milk and form curds. Chymosin is extracted, purified, and concentrated from microorganisms that carry gene coding for chymosin.

Materials Needed:

- Cheese kits – For free vials of chymosin contact Utah State University Biotechnology Center, 435-797-2906. Kits for 25 samples or large scale, currently free of charge.
- Whole milk
- Buttermilk
- Mixing bowl and spoon
- Small plastic disposable cups
- Medicine dropper or disposable pipettes
- Measuring cups and spoons
- Wooden popsicle sticks
- Gauze or cheesecloth
- Slow cooker
- Timer
- Thermometer

Activity Outline:

Handy Information:

- * Salt may be added to milk mixture before the experiment for a better tasting cheese, or salt the curds individually after the cheese is made.
- * Wooden popsicle sticks can be used for this experiment or coffee stir sticks are also a good choice. Also, small plastic cups can be used to warm the milk.
- * One cheese sample takes five minutes to make if the cups of milk are already poured.

1. Divide the children into small groups to take turns doing this activity.
2. Prepare milk mixture. The milk mixture is three parts milk to one part buttermilk.
3. Mix the milk and buttermilk in a bowl or container.
4. Pour two teaspoons of the milk mixture in each disposable cup, one for each student.

5. Prepare water bath by putting about two or three inches of warm tap water in a slow cooker adjusting the temperature to 41°C (106°F).
6. When the water is warm enough, have the students hold their cup just below the water line in the slow cooker to warm the milk and swirl gently for one minute. Be careful not to get any water in the experiment cup.
7. Add one drop of diluted chymosin and swirl the cup gently for about ten seconds to mix it up. Put the cup back in the slow cooker. Hold the cup in the slow cooker to incubate. (The less movement the better for the rest of the experiment.)
8. Hold the cup in the slow cooker pot for about 30 seconds. Tilt the cup. What do you see? Is the milk getting thicker? It should be. Timing is not critical, but it is better to lengthen rather than shorten incubation.
9. Put the cup back into the slow cooker and hold for 60 more seconds. Tilt the cup after 30 seconds and again after one minute to check for thickening. The milk should look like thick yogurt. If it is still liquid, add one more drop of the enzyme. If it looks like curdled milk proceed to the next step.
10. Keeping the cup in the slow cooker and using the wooden popsicle stick, draw a tic-tac-toe pattern in the bottom of the cup. The mixture should look like unstirred yogurt. You will not see the cuts you have made until further incubation. Do not cut it further.
11. After 30 more seconds, look to see if cuts are visible. A liquid should be forming where you cut the curd with the wooden popsicle stick.
12. Gently stir the curd with the wooden popsicle stick and put the cup back in the slow cooker for an additional 30 seconds. The thick white part is the curd and the watery liquid is the whey. If students do not see where the cuts were made at this point, incubate a little longer. The longer the sample is left in the water bath, the firmer the curd becomes and the more whey is excreted. This timing is another source of variability.
13. Tell the students to hold one hand over a wastebasket or sink. Make a pocket of the gauze in their hand and pour the mixture into the pocket, letting the whey drain from the cheese curd.
14. Twist the top of the gauze closed and gently squeeze the bottom to strain the whey.
15. Students can eat the cheese curd. They have just made cottage cheese!

Discussion Questions:

1. Describe the process of cheese-making from cow to store.
2. Since cheese-making is a biotechnological process, and has been around a long time, is biotechnology new? (Students should realize that biotechnology has been going on for a long time, although the scientific processes were not understood.)

Related Activities:

1. Try different types of cheese and compare their taste and texture.
2. Research cheese production in the U.S. How many dairy cows are used for this?
   Illinois produces 115 million pounds of cheese each year. How much cheese do other states produce?

Other Resources:

1. The Illinois Farm Bureau® produces an educational magazine called *Ag Mag*. *Ag Mag* 14 focuses on dairy topics such as dairy cows, milking, dairy nutrition, ice cream, cheese, butter, and career information. Contact your county Farm Bureau® to receive free copies for your classroom.
2. *Extra Cheese, Please! Mozzarella's Journey from Cow to Pizza* by Cris Peterson.
3. *"Just Say Cheese Please!"* and *"Cheese Can Do"* brochures from the Southwest Dairy Museum, Inc., P.O. Box 936, Sulphur Springs, Texas 75483, (903) 439-MILK.
4. American Dairy Association of Illinois, 1 West Front Street, El Paso, IL 61738.
   Ph: (309) 527-4095.

A Bean Named Soy

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

1. Educate students about plant growth, and more specifically, soybean plants.
2. Help students become aware of the importance of soybeans.
3. Provide students with materials to make soynuts.
4. Help students understand the parts of the soybean seed and the soybean plant.
5. Teach students how soybeans are processed and used in foods.

Students:

1. Learn about soybeans, the parts of the soybean seed and plant, and plant growth.
2. Understand how the soybean is processed and used in foods.
3. Use math skills (multiplication and percentage) to answer questions about soybeans.

Illinois Learning Standards: 6.B.2; 6.C.2a; 7.A.2b; 12.A.2a; 17.C.2b; 17.C.2c

Introduction:

Many things in nature help regulate the growth of a plant—the soil, its nutrients, air, water, climate, temperature, and light. These are known as environmental factors. Plants need nutrients to grow and water to move these nutrients to the different parts of the plants.

Most plants have chlorophyll, the green coloring in plants that uses the energy from light to manufacture sugar ($C_6H_{12}O_6$). This sugar and other carbohydrates formed are used as food to enable the plant to grow. This process is called photosynthesis. Plants grown in the dark lose their chlorophyll and green coloring. Without light and chlorophyll the plant is unable to make sugar. This slows plant growth and can cause the plant to die. When the soil loses nutrients and plants can no longer grow properly, fertilizer can provide the nutrients needed for the plant to grow.

Soybeans are called "The Miracle Seed" because they are used for human food, consumer and industrial products, and livestock feed. Soybeans are one of the nation's most fascinating and versatile edible plants. In 1998, Illinois farmers harvested 10,700,000 acres of soybeans. These 10,700,000 acres produced 469,000,000 bushels of soybeans.

One bushel of soybeans, which weighs 60 pounds, produces 11 pounds of soybean oil. About 90 percent of this oil is used in the preparation of food products. The remaining 10 percent is used in consumer and industrial products. Soy inks, plastics, biodiesel fuels, and biocomposite building materials are a few of the industrial uses that have been developed using soybean oil, in place of petroleum. Scientists and researchers continue to work to replace petroleum with soybean oil in many other products and to create new uses for soybeans.

Each year's soybean crop develops from soybean seeds. The soybean seed contains a seedling (young plant) and food for it. The main parts of the soybean seed are:

Hilum – the part of the seed attached to the pod. The hilum is often black or brown, but is yellow on some varieties.

Seed Coat – a thin covering that protects the seed's embryo from insects, disease, and damage.

Cotyledon – the part of the seed that stores food for the seedling. Each bean has a pair of cotyledons forming a protective shield around the seedling.

Epicotyl – the part of the plant that grows. The stem forms and grows from this point.

Hypocotyl – forms the stem below the cotyledon.

Radicle – the main (primary) root of the seedling. It takes up water and nutrients from the soil to nourish the seedling.

After soybeans are harvested, they are sold to a grain elevator, fed to livestock, or stored in a grain bin until they are sold. When soybeans are sold, they are taken to processing plants or exported.

In processing, the soybeans are cleaned, cracked, dehulled, and rolled into flakes. The hulls (outer coverings) are used as additives for breads, cereals, and snacks. Then the oil is removed from the soybean and the remaining soybean flakes are processed into various edible soy protein products. Soybean oil finds its way into such products as margarine, salad, and cooking oils.

Lecithin, extracted from the soybean oil, is used for everything from pharmaceuticals to protective coatings. It is a natural emulsifier and lubricant. Lecithin keeps chocolate and cocoa butter in a candy bar from separating.

Materials Needed:

- "Figuratively Speaking" worksheet
- "Development of the Soybean Plant" handout
- "Main Parts of the Soybean Seed" handout
- 1 cup soybeans for each student
- 2 tsp. baking soda for each student
- 4 cups water for each student (plus water for soaking the soybeans)
- Salt (1 teaspoon for each quart of water used to soak the soybeans)

Activity Outline:

1. Discuss soybean production and plant parts using the information in the introduction, "Development of the Soybean Plant" handout, and the "Main Parts of the Soybean Seed" handout.
2. Make soynuts as a class.
    a. Soak the soybeans in water overnight in the refrigerator. Add one teaspoon of salt to each quart of water used before adding the soybeans to the water.
    b. Boil one hour in the same water.
    c. Drain and air dry the boiled soybeans.
    d. Spread in a single layer in a shallow pan.
    e. Roast in 350°F oven for 30 minutes. Stir the soybeans after 15 minutes, then stir every five minutes until golden brown and crunchy.
    f. Eat the soynuts!
3. Ask students to complete the "Figuratively Speaking" worksheet. This worksheet is an exercise which uses percentages and multiplication to solve questions about soybeans.

Discussion Questions:

1. Have you ever eaten a soybean? If so, what was it like?
2. What does a plant need to grow and survive?
3. What part of the seed stores food for the embryo?
4. What do we call the point of attachment between the seed and pod?
5. What is the function of the seed coat?
6. What is the growing point of the plant forming the stem?
7. What are some products made from soybeans?
8. How is the soybean seed processed to use in foods?

Related Activities:

1. The Illinois Farm Bureau® has produced an educational magazine entitled *Ag Mag* 10. *Ag Mag* 10 "Imagine a Bean…, It's the Coolest Thing!" contains activities such as making soybean crayons and writing a soybean sonnet. Contact your county Farm Bureau® to get copies for your classroom.
2. Visit a grain elevator or farm where soybeans are grown. Write a description of the visit.
3. Use soybeans to create an art project.
4. Bring in labels showing soybeans or soybean by-products used in an item.
5. Make a bulletin board of soybean products.
6. Share foods made from soybeans in the classroom.
7. Discuss how the soybean evolved, and why it is still important in the field of agriculture.

Other Resources:

1. "Soybeans: The Miracle Crop" kit for grades 4-6, Illinois Soybean Association, Illinois Soybean Checkoff Board, 1605 Commerce Parkway, Bloomington, IL 61704, (309) 663-SOYA.
2. The Indiana Soybean Kit, available for loan from many county Farm Bureaus®.
3. "The Soybean Solution," Nebraska Soybean Association, 301 Centennial Mall So., Fourth Floor, Box 95144, Lincoln, NE 68509.
4. "Captain Soybean and his Protein Potent Pals Wonder Book," Illinois Soybean Association, Illinois Soybean Checkoff Board, 1605 Commerce Parkway, Bloomington, IL 61704, (309) 663-SOYA.
5. "The Miracle Crop . . . SOYBEANS," A brochure from the Illinois Soybean Association and the Illinois Soybean Checkoff Board, 1605 Commerce Parkway, Bloomington, IL 61704, (309) 663-SOYA.
6. *Why the Brown Bean was Blue* by Susan M. Pankey, Nebraska Ag in the Classroom, 5225 S. 16th St., Lincoln, NE 68512, (402) 421-4400.
7. "Where's Bennie?" Coloring Book, Indiana Soybean Development Council, 423 West South Street, Lebanon, Indiana, 46052, (317) 482-4376.
8. Ag in the Classroom Video Lesson Plans on Soybeans featuring "Sandy Soybean," North Carolina Farm Bureau® & North Carolina Soybean Producers Association, P.O. Box 27755, Raleigh, NC 27611, (919) 783-4326 or (919) 782-1705.
9. "Soy McCoy Coloring Book," Ohio Soybean Council, P.O. Box 479, Columbus, Ohio 43216.
10. "The Magic Bean: A Look at the Versatile Soybean," "Look Where Soybeans Go," brochures from Archer Daniels Midland Company, Box 1470, Decatur, Illinois 62525, (217) 424-5200, http://www.admworld.com.
11. "1995 Soy Stats," a reference guide, American Soybean Association, P.O. Box 419200, St. Louis, MO 63141-9200, (314) 576-1770.
12. Illinois Soybean Association, Illinois Soybean Checkoff Board: www.ilsoy.org/.
13. American Soybean Association: www.oilseeds.org/asa/.
14. Soybean Statistics: www.ag.uiuc.edu/~stratsoy/96soystats/pg2.html.

To be used with:
A Bean Named Soy

Name ______________________________

"Figuratively Speaking"

Read *Ag Mag* 10 "Imagine a Bean…It's the Coolest Thing" from the Illinois Farm Bureau® and then answer the following questions about soybeans.

An average bushel of soybeans weighs 60 pounds. Of each bushel, 80 percent becomes soybean meal and 20 percent is processed as soy oil.

1. How many pounds of soybean meal are produced from each bushel?

2. How many pounds of oil are produced from the same bushel?

3. If one pound of soy oil will fill a one-quart bottle half full, how many quarts of oil will be produced by a single bushel?

4. Eddie and Jodi sold 430 eight-ounce bags of soynuts at $.75 per bag before the basketball game. How many pounds of roasted soynuts were sold? (hint: 16 oz. = one lb.)

5. How much money did Eddie and Jodi make from selling the soynuts?

6. How much would 50 bushels of soybeans weigh?

7. How many pounds of soybean meal would come from 50 bushels of soybeans?

8. How many pounds of soybean oil would come from 50 bushels of soybeans?

9. An acre produces about 38.5 bushels of soybeans. How much would 38.5 bushels of soybeans weigh?

10. How many bushels of soybeans would be produced on 200 acres?

To be used with:
A Bean Named Soy **Answer Key**

"Figuratively Speaking"

Read *Ag Mag* 10 "Imagine a Bean…It's the Coolest Thing" from the Illinois Farm Bureau® and then answer the following questions about soybeans.

An average bushel of soybeans weighs 60 pounds. Of each bushel, 80 percent becomes soybean meal and 20 percent is processed as soy oil.

1. How many pounds of soybean meal are produced from each bushel? **48 pounds** (60 x .80)

2. How many pounds of oil are produced from the same bushel? **12 pounds** (60 x .20)

3. If one pound of soy oil will fill a one-quart bottle half full, how many quarts of oil will be produced by a single bushel? **6 quarts** (12 ÷ 2)

4. Eddie and Jodi sold 430 eight-ounce bags of soynuts at $.75 per bag before the basketball game. How many pounds of roasted soynuts were sold? (hint: 16 oz. = one lb.) **215 pounds** (430÷2)

5. How much money did Eddie and Jodi make from selling the soynuts? **$322.50** (430 x .75)

6. How much would 50 bushels of soybeans weigh? **3000 pounds** (60 x 50)

7. How many pounds of soybean meal would come from 50 bushels of soybeans? **240 pounds** (300 x .80)

8. How many pounds of soybean oil would come from 50 bushels of soybeans? **60 pounds** (300 x .20)

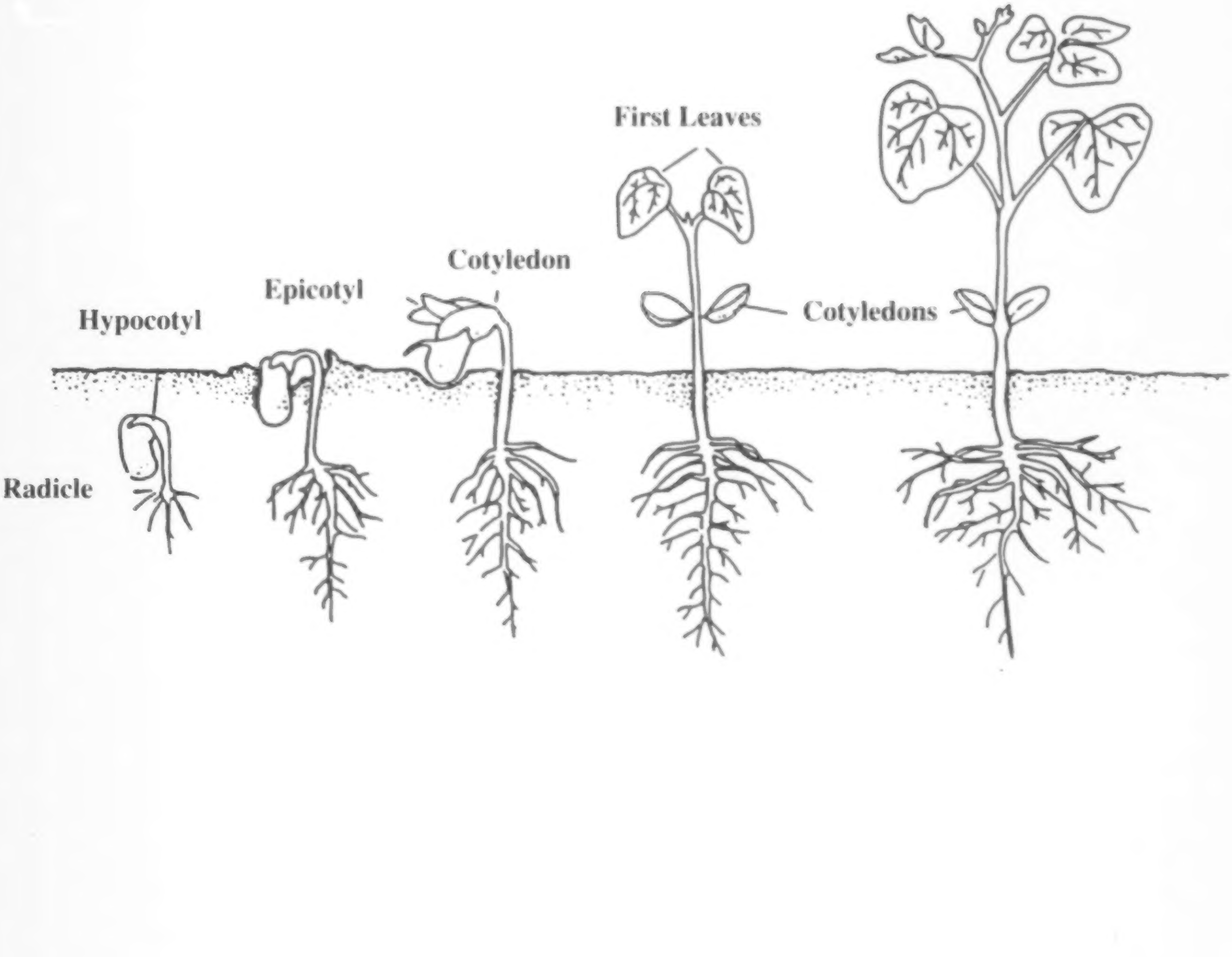
9. An acre produces about 38.5 bushels of soybeans. How much would 38.5 bushels of soybeans weigh? **2310 pounds** (38.5 x 60)

10. How many bushels of soybeans would be produced on 200 acres? **7700 bushels** (200 x 38.5)

To be used with:
A Bean Named Soy

Name ______________________________

Development of the Soybean Plant


First Leaves
Cotyledon
Epicotyl
Hypocotyl
Cotyledons
Radicle

To be used with:
A Bean Named Soy

Name ______________________________

Main Parts of the Soybean Seed

Hilum - point of attachment between seed and pod.

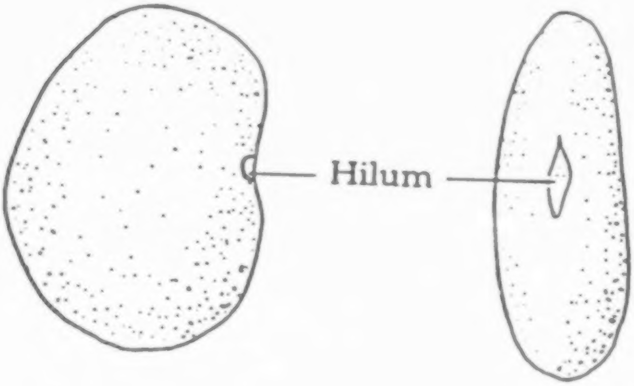
Hypocotyl - forms the stem below the cotyledon.

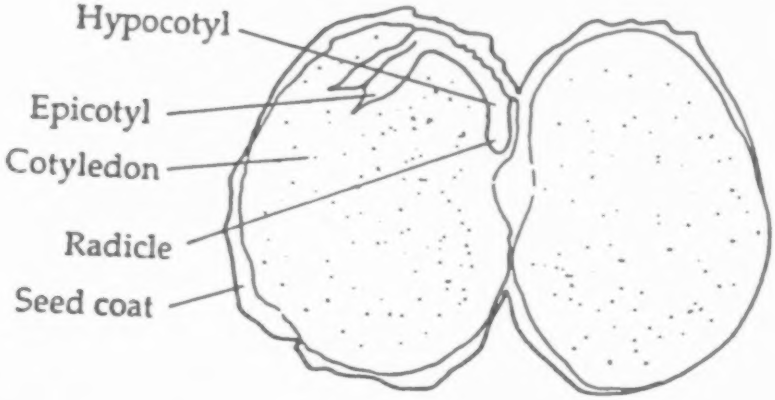
Epicotyl - growing point of plant, and forms the stem of the plant.

Cotyledon - stores food for embryo plant.

Radicle - forms the primary root.

Seed Coat - protects embryo from insects, disease, and damage.




Hypocotyl
Epicotyl
Cotyledon
Radicle
Seed coat

Excellent Earthworms

Grade Level: 4-6

Approximate Length of Activity: 20 minutes, plus 5-10 minutes three days later

Objectives:

Teacher:

Help students learn about earthworms and cycles in nature.

Students:

1. Observe earthworms and learn how they are beneficial to our environment.
2. Identify and describe several characteristics of earthworms.

Illinois Learning Standards: 11.A.2b; 12.A.2a; 12.B.2a; 12.B.2b

Introduction:

Earthworms can be found in warm, moist soil throughout the world. They may be different sizes. Some may be only one millimeter long, and some may be 11 feet long!

Earthworms are great recyclers because they take food scraps and other decaying matter in the soil and turn it into nutrients for plants. Whether it is humus (dead plant material) or food scraps, earthworms eat all kinds of things that are soft to chew. This earthworm "food" is digested and then excreted back into the soil in a nutrient-rich matter that helps plants grow.

Earthworms also dig through soil and mix it up. Particles of sand, silt, and clay make up most of the mineral content of soils. As earthworms dig, they loosen the soil and mix the different types so plants have a better environment to grow. Earthworms also provide air passages for soil, which help plants grow. Other organisms found in soil include plant roots, insects, and small mammals.

Materials Needed:

- 2 jars
- Lids with holes
- Dark soil
- Sandy soil (bright color)
- 2 earthworms
- Carrot scraps
- Dark paper (2 pieces)
- Masking tape
- Water

Activity Outline:

1. In the bottom of each jar, put a layer of dark soil about one inch thick. Then place a one-inch thick layer of light sandy soil. Keep alternating layers until the jar is three-fourths of the way full.
2. Slightly moisten the soil in both jars with water.
3. Place the two earthworms in *one* jar, and then add some carrot scraps to *both* jars.
4. Put a lid *with holes* on each jar. Label the jar with earthworms as "Earthworms" and label the other jar "No Earthworms."
5. Take the dark pieces of paper and wrap around each jar. Tape tightly. Put the jars aside.
6. Have each student write down their predictions about what they think will happen in each jar.
7. After three days unwrap the jars. See what has happened!

Discussion Questions:

1. Which jar contained earthworms? Describe the soil in each jar.
2. Which jar do you think is a better place for a plant to grow? Why?

Related Activities:

1. Keep putting food scraps in the jar with the earthworms and continue a month-long observation.
2. Have the class make a compost bin and put earthworms in it, then observe what happens.

Weed Competition

Grade Level: 4-6

Approximate Length of Activity: 30-40 minutes to set up; several days of observation

Objectives:

Teacher:

1. Integrate an aspect of horticulture into a science lesson.
2. Help students conduct an experiment that includes observation and recording techniques.

Students:

1. Understand the need to eliminate weeds in a food or fiber crop.
2. Conduct an experiment and use observation and recording techniques to demonstrate that seeds germinate at different times due to an environmental factor.
3. Understand that yield losses occur in crops because of weeds.

Illinois Learning Standards: 11.A.2b; 11.A.2c; 11.A.2d; 11.A.2e; 12.B.2b

Introduction:

Weeds are plants that grow where people do not want them. They grow in gardens, parks, cracks in sidewalks, pastures, sides of buildings, flowerbeds, and fields. Weeds reappear even after pulling them or applying an appropriate herbicide. They are spread by wind, water, animals, and vehicles and are able to grow in various climates.

Farmers do not want weeds in their fields because they take water, sunlight, soil nutrients, and space away from the crop. Weeds are also unattractive, and most people prefer to keep them out of their property.

Dandelions are a weed that grows all over the United States. They are very hardy plants. They bloom from early spring to late fall. Dandelions have long taproots so they always get plenty of moisture. Dandelions are a nuisance, and many people use herbicides to keep them from growing in lawns.

This classroom experiment allows students to see that seeds germinate at different times, dandelions adapt to many environments, and yield losses occur because of weeds.

Materials Needed:

(Per group of three students)

- 2 clear plastic cups
- Masking tape
- 4 soybean seeds
- Dandelion seeds
- Potting soil
- Water
- Plastic wrap
- 2 rubber bands
- Marker

Activity Outline:

1. Discuss the information in the introduction with the students.
2. Explain that the experiment shows how weeds can be a problem in crops.
3. Have students write their name and date on pieces of masking tape, and place them on the outside of each clear plastic cup.
4. Have students put two to three inches of soil in a cup, place two soybean seeds next to the side of the cup, and cover with one-half inch of soil. Label this cup the soybean cup. Repeat this process with both soybean and dandelion seeds in the second cup. Label this cup the soybean/dandelion cup. Make sure that the seeds can be seen up against the sides of the plastic cups.
5. Add water until soil is moist.
6. Cover the top of the cups with plastic wrap. Use a rubber band to hold the plastic wrap in place. (Some students should place their cups near a window and some students should place their cups in a dark, cool area.)
7. Make sure the soil is kept moist during the experiment; if necessary, add water to the seeds/plants. Do not allow the soil to become too dry. After the plants have sprouted a few leaves above the soil surface, the plastic wrap can be removed.
8. Have the students form a hypothesis as to what will happen in each of the cups.
9. Have students record observations each day.
10. Students will draw conclusions according to the results of their experiment. (Weeds inhibit the growth of crops, seeds germinate at different times, and dandelions adapt to many environments.)
11. Have the students make a graph to show the differences in the germination speed of the two types of plants.

Discussion Questions:

1. Did the soybean cup or soybean/dandelion cup germinate first?
2. How many days difference was there?
3. Does it matter if the cups were placed in a dark, cool area instead of near a window? Did the weeds grow better than the soybeans in the dark, cool conditions?
4. Draw a conclusion about the experiment. In what ways do weeds inhibit the growth of the soybean seeds (and other seeds)?
5. Do you think food and fiber producers should try to control the weeds in their fields? Explain.

Related Activities:

1. Research the different types of weeds that are harmful to crops and report to the class how they are controlled.
2. Research insects that are harmful to specific farm crops and what can be done to control them.

Magic Machines

Grade Level: 4-6

Approximate Length of Activity: 45 minutes

Objectives:

Teacher:

1. Provide information about types of farm equipment.
2. Emphasize how farm equipment makes farmers' jobs easier.
3. Encourage creativity by inventing a new type of farm equipment.

Students:

1. Learn how farm equipment helps farmers.
2. Learn how different types of equipment work.
3. Describe what farm life would be like without modern machinery.
4. Invent a new type of farm equipment.

Illinois Learning Standards: 13.B.2a; 13.B.2c; 17.C.2c

Introduction:

Farmers use many types of machinery and equipment to help them with their job. Some of them include tractors, combines, planters, mowers, tractor loaders, hay balers, and spreaders. This is not all of the equipment/machinery that farmers need. The type of farming a farmer does determines what type he or she needs. Today's equipment and machinery help grain and livestock farmers produce better quality products in larger amounts. This means that one farmer can feed more people now than ever before.

Here are some of the pieces of equipment or machinery farmers might need:

Combine - Since the 1930s farmers have used combines to pick grain from fields. It is called a "combine" because it combines the tasks of picking and threshing into one operation. These tasks used to be done separately. A combine separates grain from stalks as it cuts a crop in the field. As the combine cuts the grain out of the field, it also removes the corn kernels from the cob and the soybeans from the soybean pods. The crop is stored in a big tank that is part of the combine. When full, the auger, a long arm on the side of the combine, moves the crop from the storage tank and dumps it into a truck or wagon.

Irrigation System – Irrigation systems give crops extra water when there is not enough rainfall to produce the best plants. One type is surface irrigation, which carries water through canals from bodies of water to holding ditches to the crops. Another type is sprinkler irrigation, which pumps water from a well into a sprinkler which waters the crops.

Spreader – A spreader is a piece of equipment that spreads fertilizer onto the crops. Fertilizer contains nutrients that help crops grow.

Hay balers – A hay baler is a machine that rakes the straw or hay and packs it together into round or square shapes. Hay balers also put twine around the bale and drop it back onto the ground in the field.

Feeders – Automatic feeders make feeding animals easier. The feed is mixed by a machine and then sent to the animals on a conveyor belt. Some large feed mixers can weigh two tons when they are full. Automatic feeders are used for feeding many types of animals. This saves a lot of hard work for the producer.

Sprayer – Sprayers spread liquid crop protection products to reduce insects and weeds. Sprayers usually have booms, which are arms that hang over and spray the crops. Some sprayers have booms that are 60 feet wide!

Milking Machine – Milking machines are used by dairy farmers. The machines milk the cows using a suction system and transport the milk through pipes to the bulk milk cooler. By hand, a farmer used to spend two and one-half hours milking 20 cows. With a milking machine, a farmer only spends 15 minutes milking 20 cows.

Grain Bin – These tall metal bins hold animal feed and keep it fresh for a long time. Today, most grain bins can be activated to drop feed onto a conveyor which feeds the animals.

Bulk Milk Cooler – Bulk milk coolers keep milk cold until the dairy company comes to transport it to the dairy plant. Some milk coolers can hold up to 8000 gallons of milk.

Tractor – A tractor does many things on a farm. It is used to plant, cultivate, and pull heavy loads, pull wagons filled with grain, and much more. Tractors can pull these heavy machines and equipment because they have powerful engines. In fact, tractor engines are so powerful they equal the same power as 200 horses would have. Tractors also have huge tires to keep them from compacting the soil.

Silo – Silos are structures which store chopped plants and grains, or silage. Silage is fed to cows, and silos keep the feed dry and fresh. Most silos are round and above ground. Some other types are the trench, bunker, and box silos. Silos are filled at the top by machines, and the silage is packed tightly as it fills the silo. Silage is unloaded from the bottom. A large silo can hold seven million pounds of silage. Silos can be made with stone, brick, clay tile, sheet metal, concrete, wood blocks, or fiberglass-lined steel. Today many farmers bag silage to keep it fresh.

Planter – A planter is a piece of equipment used to plant seeds in the fields. Planters put the seeds in the soil and cover the seeds with more soil. Planters have tanks to hold the seeds that will be planted. There are seed meters on the planters to drop the right amount of seeds into the soil. There is a row of wheels on the planters to cover the seeds with soil once they are dropped into the field. There are different types of planters that plant different crops. Farmers use corn planters to plant corn. Farmers use a drill to plant soybeans. A drill plants the rows of soybeans closer together than corn rows. Since cornstalks grow much bigger than soybean stalks, corn needs to be planted in wider rows. Soybeans can be planted in narrower rows, which also helps a farmer plant more rows of soybeans in one field.

Cultivator – Cultivators are used to loosen soil between the rows of plants and dig out weeds.

Materials Needed:

- "Magic Machinery" handouts
- "Farm Equipment" worksheet

Activity Outline:

1. Read *Fun Facts About Farm Equipment* by Ray H. Miller or another farm machinery book to your class. (If you are unable to obtain a book, use the introduction information and the "Magic Machinery" handouts to introduce students to farm equipment.)
2. Show each student the "Magic Machinery" handouts. These handouts will help students learn what the pieces of equipment look like.
3. Give each student the "Farm Equipment" worksheet. This worksheet is an activity that asks students to match the description of a piece of equipment with its name.

Discussion Questions:

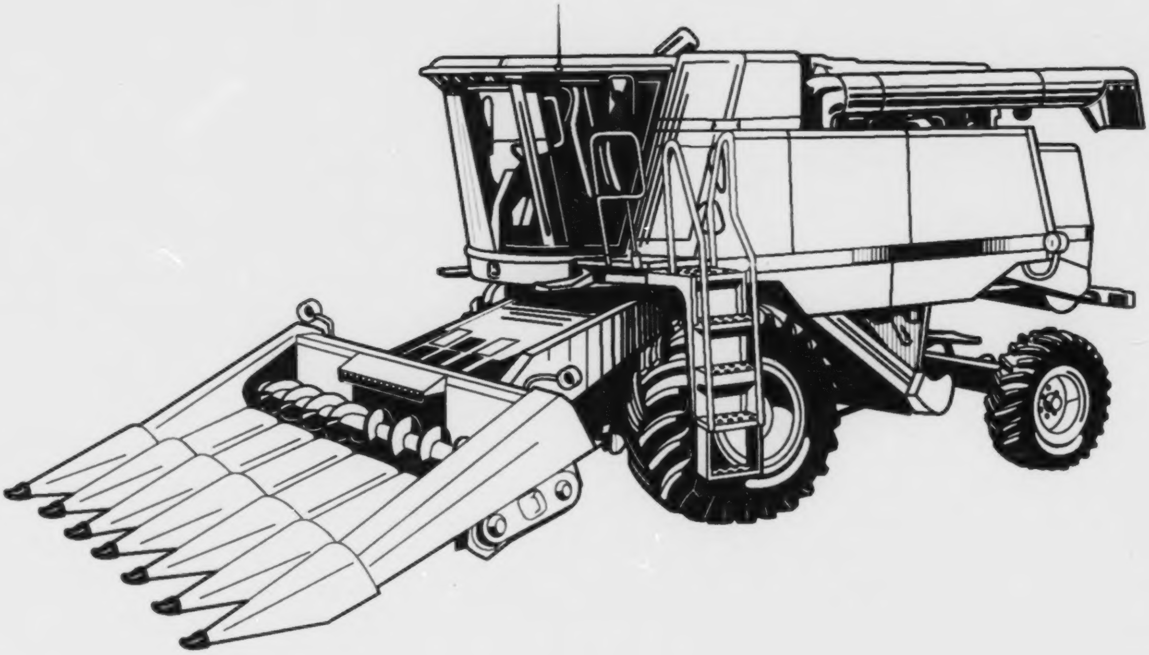
1. Describe what farm life would be like without modern machinery.
2. If you could invent a piece of farm equipment, what would it be?
3. Why are tractors important on farms?

Related Activities:

1. Use Illinois Farm Bureau's® *Ag Mag* 15 "Safety Sleuths" to learn about farm safety. Includes career information and activities. Contact your county Farm Bureau® to obtain copies.
2. Illinois Farm Bureau's® *Ag Mag* 8 focuses on technologies in production agriculture. Use this issue to teach your students more about agricultural technology and careers.
3. Think of simple machines (gears, pulleys, etc.) which might be part of different types of farm equipment.

To be used with:
Magic Machines

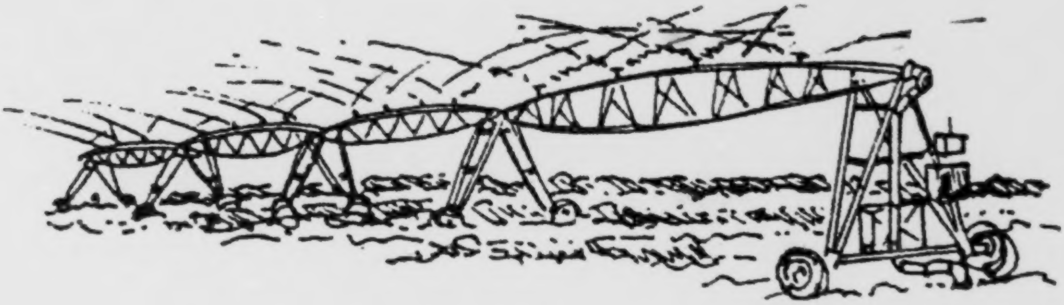
Magic Machinery



Combine

To be used with:
Magic Machines

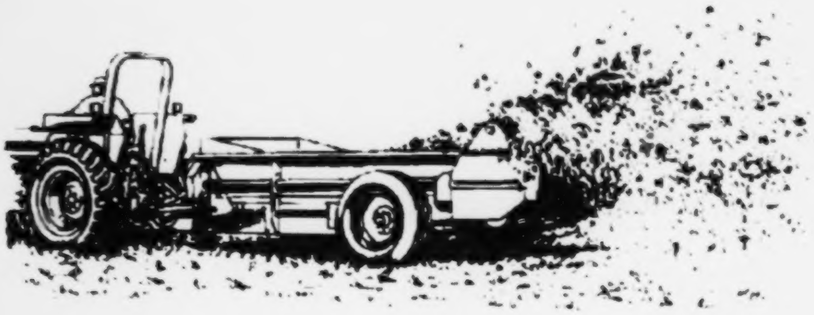
Magic Machinery



Irrigation System

To be used with:
Magic Machines

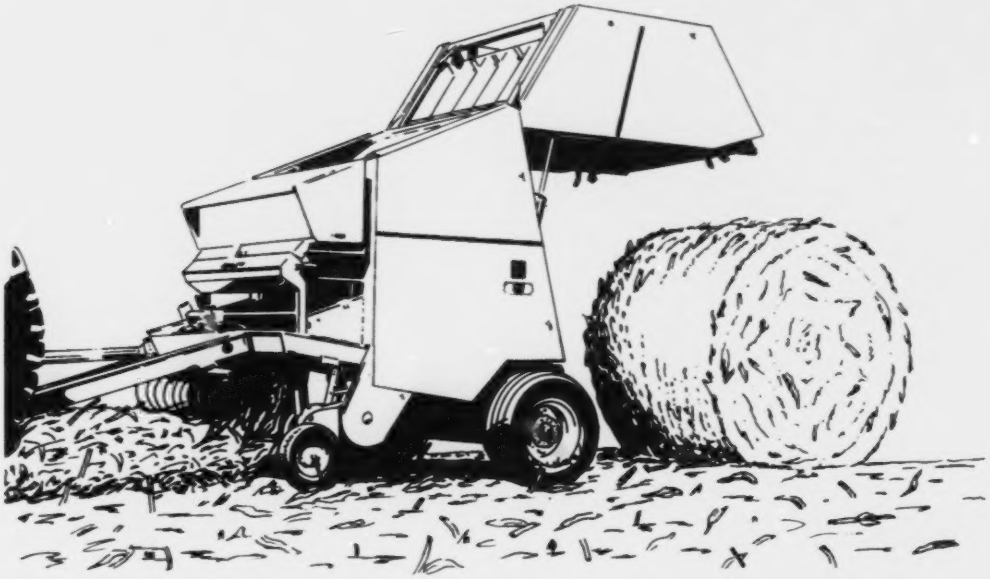
Magic Machinery



Spreader

To be used with:
Magic Machines

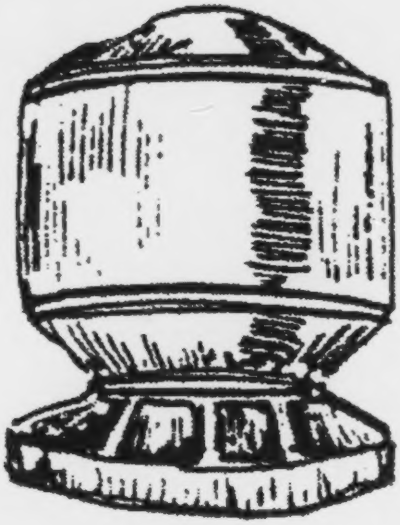
Magic Machinery



Hay Baler

To be used with:
Magic Machines

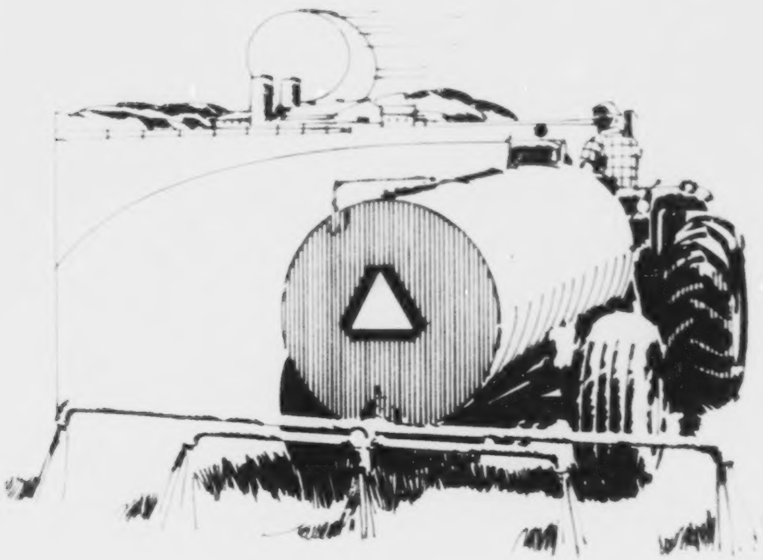
Magic Machinery



Feeders

To be used with:
Magic Machines

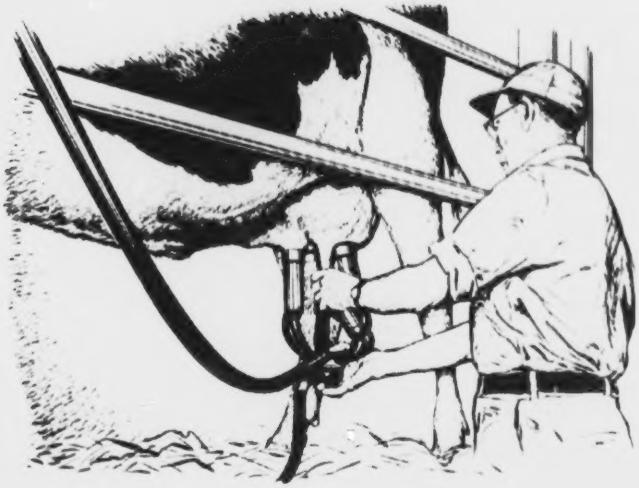
Magic Machinery



Sprayer

To be used with:
Magic Machines

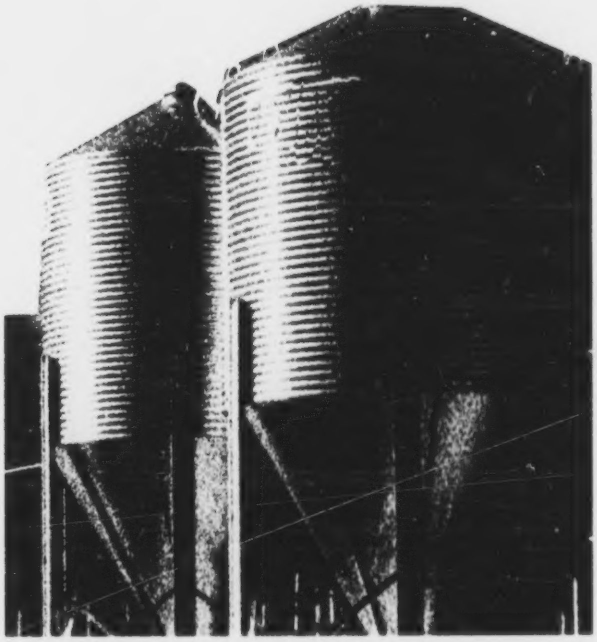
Magic Machinery



Milking Machine

To be used with:
Magic Machines

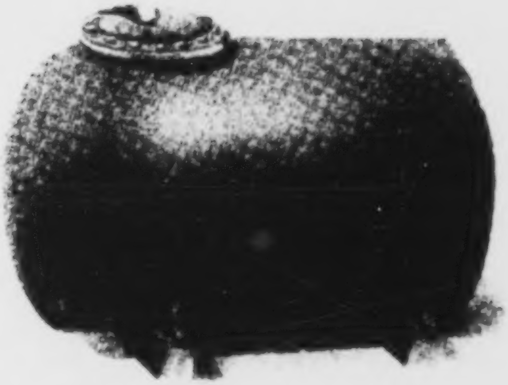
Magic Machinery



Grain Tank

To be used with:
Magic Machines

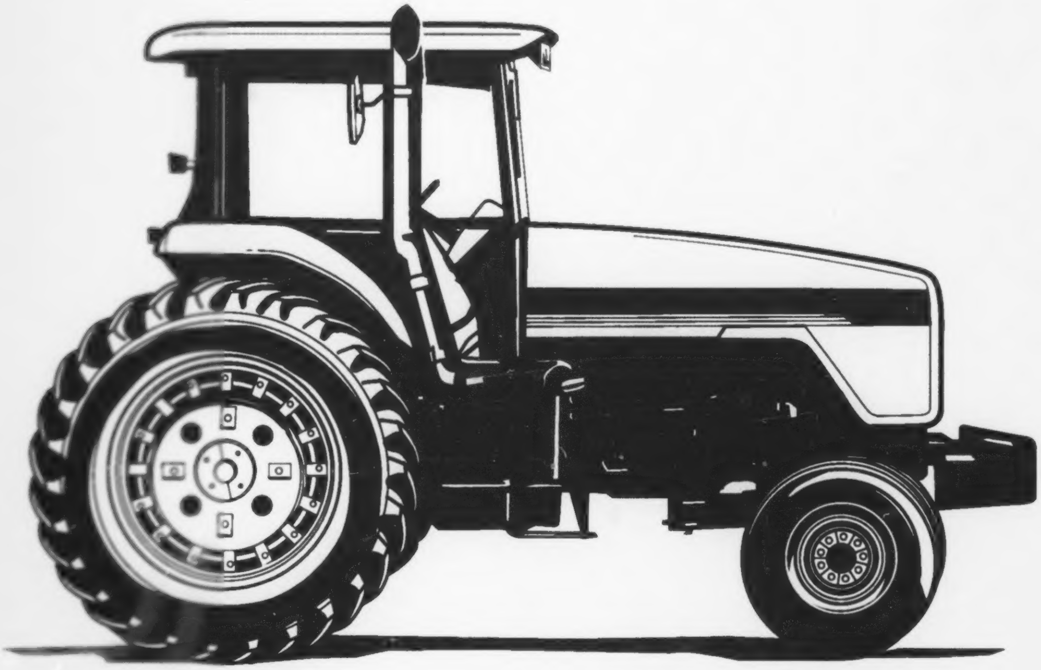
Magic Machinery



Bulk Milk Cooler

To be used with:
Magic Machines

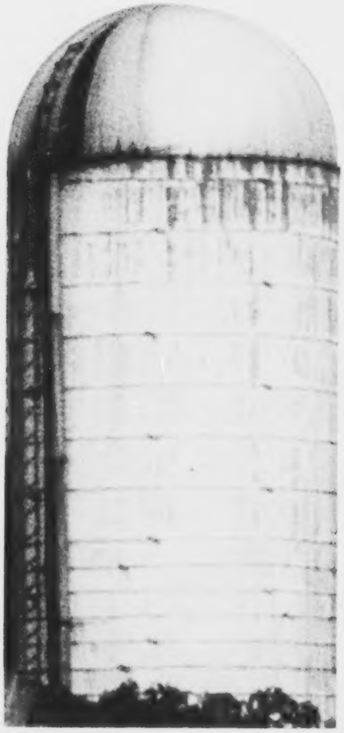
Magic Machinery



Tractor

To be used with:
Magic Machines

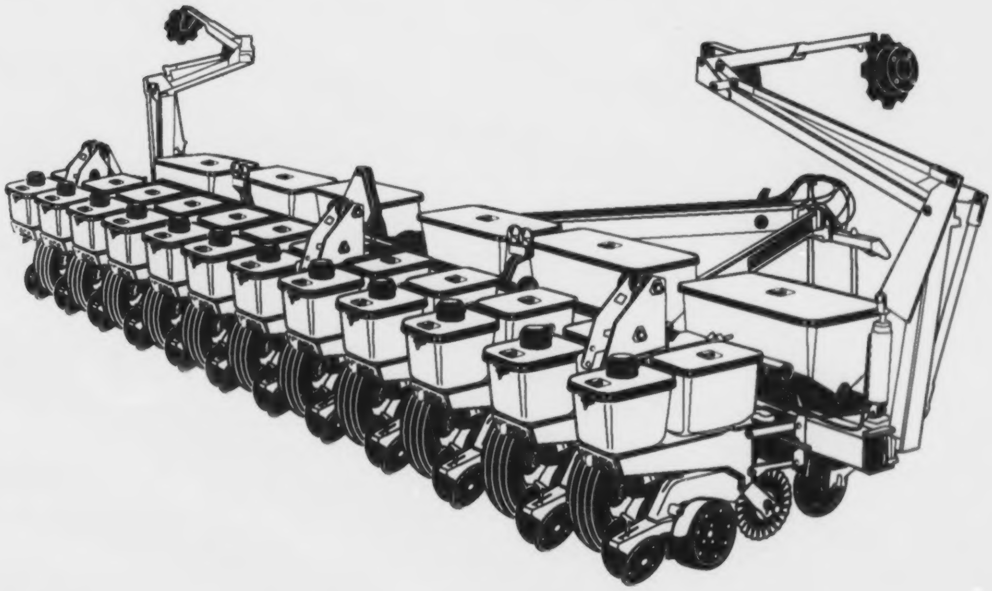
Magic Machinery



Silo

To be used with:
Magic Machines

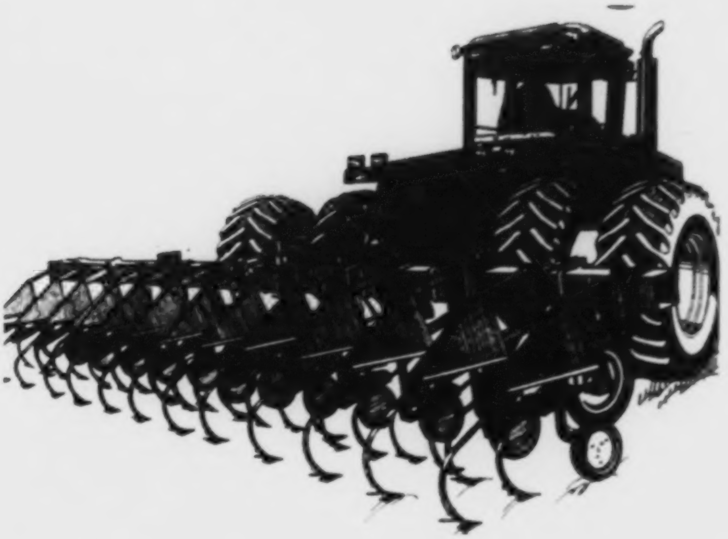
Magic Machinery



Planter

To be used with:
Magic Machines

Magic Machinery



Cultivator

To be used with:
Magic Machines

Name ______________________

Farm Equipment

Directions: In each box, write the name of a piece of farm equipment that fits the description. Use the equipment at the bottom of the page.

Has a suction system to pump milk

Spreads fertilizer

Gives crops extra water

Loosens soil and digs out weeds

Holds silage for cows

Has a tank to hold seeds to plant

Sprays for weeds and insects

Harvests crops such as wheat and corn

Has a rake to gather hay

Automatically feeds animals

Pulls a heavy load

Holds feed for animals

Keeps milk cold

Farm Equipment Bank

Planter
Spreader
Milking Machine
Silo
Combine
Hay Baler
Grain Tank
Cultivator
Feeders
Bulk Milk Cooler
Irrigation System
Sprayer
Tractor

To be used with:
Magic Machines

Answer Key

Farm Equipment

Directions: In each box, write the name of a piece of farm equipment that fits the description. Use the equipment at the bottom of the page.

Milking Machine	Has a suction system to pump milk
Spreader	Spreads fertilizer
Irrigation System	Gives crops extra water
Cultivator	Loosens soil and digs out weeds
Silo	Holds silage for cows
Planter	Has a tank to hold seeds to plant
Sprayer	Sprays for weeds and insects
Combine	Harvests crops such as wheat and corn
Hay Baler	Has a rake to gather hay
Feeders	Automatically feeds animals
Tractor	Pulls a heavy load
Grain Tank	Holds feed for animals
Bulk Milk Cooler	Keeps milk cold

Farm Equipment Bank

Planter
Spreader
Milking Machine
Silo
Combine
Hay Baler
Grain Tank
Cultivator
Feeders
Bulk Milk Cooler
Irrigation System
Sprayer
Tractor

Growing Money

Grade Level: 4-6

Approximate Length of Activity: One to three class periods

Objectives:

Teacher:

1. Help the students understand the types of things people need to start a business.
2. Provide materials to students to help them run their "business."
3. Help the students understand how each decision they make affects the success of the business.
4. Teach the students about vegetative propagation.

Students:

1. Understand the many aspects involved in building a business.
2. Know what the term "capital" means.
3. Show an understanding of vegetative propagation by taking cuttings from plants.

Illinois Learning Standards: 12.A.2a; 13.A.2b; 13.A.2c; 15.A.2a; 15.B.2a; 15.B.2b; 15.B.2c; 15.C.2a; 15.C.2c; 26.B.2d; 27.A.2b

Introduction:

This lesson allows your class to build a business of selling plants from cuttings. The following information about economies, business, and plants will be helpful.

Ancient Greeks invented the word "economy." An economy is a system where things are bought and sold. The condition of our country's economy depends on how well services, goods, materials, and wealth are produced, distributed, and consumed. The state of our economy is important to everyone in the world. It affects almost every part of our lives. People work to earn a living. We all need food to eat, clothes to wear, and a place to live.

In order to start a business, one needs capital. Capital is the money and materials put into a business to make a product(s) or provide a service(s). When the students build their businesses to sell plants, their capital is all of the supplies used to propagate the plants, grow the plants, and sell the plants.

Two more factors that affect the business are supply and demand. Is there a demand for the product or service that the business will offer? How well is the business going to be supplied? Is the business going to supply enough products or services to meet the needs of customers in the city the business is in, the regional area, the state, or the entire country? It is important to note that when a person starts a business they need to make sure their product or service is something that will be in demand. If nobody wants the product or service being produced, the business may not make money. Plus, a business needs to be located where competition will not keep the business from making a profit.

Vegetative propagation uses a plant part other than the seed to produce a new plant. These plant parts are called clones. African violets, jade plants, ivy, geraniums, philodendron, and coleus are good choices for vegetative propagation. To propagate, sections of stems are cut off at a slant with a knife because the stem section contains the tip of the shoot, or branching part of the plant. Plants used for propagation should not be so young that the stems are weak. The geranium, for example, will produce strong new shoots that have several leaves and make good cuttings in three weeks or less. Plants from which stem sections are taken should not be so old that they are tough and woody. The leaves should be removed from the end of the stem that is cut. Four or five leaves should be left at the tip end.

Materials Needed:

- "Building A Business" worksheet
- Flowerpots
- Decorations for flowerpots (optional)
- Rooting mixture (1/2 sand and 1/2 peat moss)
- Plants for cuttings (geraniums, etc.)
- Knife
- Water
- 1 – 2 boxes to start cuttings in (plastic box, number of boxes depends on size of boxes and number of cuttings to grow)
- Potting soil
- Posterboard
- Markers/crayons
- Construction paper
- Scissors
- Rubber cement/glue
- Rooting compound (optional: available from a nursery, garden shop, or landscaping business)

Activity Outline:

*Before the teacher starts this lesson he or she should select a type of plant from those mentioned in the introduction and bring it to the classroom. Depending on the size of the plant and how many cuttings one could get from it, it may be a good idea to buy more than one plant. Each group needs to get at least four cuttings. (One per student)

**When handling peat moss use rubber gloves.*

1. Have a discussion with the students about what types of things people need to start their own business. Write these things on the board. If the students are having trouble thinking of things, suggest money, people (workers), time, a place to run the business, a name for the business, possibly a logo, and supplies.

2. Discuss the term "capital" and ask your students what it means to them. Explain to them that capital means the money and materials that one puts into the business to make a product or provide a service to be sold.
3. Tell the students they will be inventing a business of their own that will grow plants and then sell them. In order to run their business they will need to understand characteristics of a business and the economy. Discuss the term "economy."
4. Explain vegetative propagation to the students. Do they know about taking cuttings from a plant? Explain to the students that in their business they will be propagating plants to make more plants. They will then make a profit by selling the new plants.
5. Split the class into groups of three to four students each. Hand out the "Building A Business" worksheet to every student.
6. First, have the students select a name for their business. Talk about how the name for their business should reflect what the business is about. Ask the students why this is a good idea. How would it help their business?
7. Next, have the students apply for a loan from the teacher for their business. Explain to the students that this is a pretend loan and that they will not actually get the money. Let each group of students borrow $100 (of pretend money) to start their business. (You may want to explain to your students that loans for businesses are often for thousands of dollars.)
8. Now the groups need to buy supplies. Write this supply list on the chalkboard so the students know how much each item will cost. Explain to the students that each group has to buy a plant, four flowerpots, enough potting soil for four flowerpots, and one piece of posterboard. Each group will get four cuttings, one for each person in the group. The amount of decorations, markers/crayons, and construction paper they buy is up to the group.

    Plant – $5.00
    Potting Soil – $1.00 per pot
    Flowerpots - $3.00 each
    Decorations for flower pots – $.50 per item
    Posterboard – $1.00 each
    Markers/Crayons – $.25 each
    Construction Paper – $.10 a sheet
    Rubber Cement/Glue - $.20 a container
9. Have the students design an advertisement on their posterboard. Discuss how creativity and neatness of advertising helps promote a business.
10. While the groups design their advertisements, the teacher should make a rooting box for the cuttings in a clean plastic box with a tight-fitting lid. Create a mixture of half-milled peat moss and half builder's sand and fill the box halfway.
11. Make cuttings about 15.5 cm long by cutting stems at a slant with a knife. Cut off the leaves of the cutting about eight to 10 cm from where the cut was made and leave four or five leaves at the tip of the cutting.
12. Dip the cut end of the cutting into a rooting compound. (This is optional.)

13. Plant the cuttings in the rooting box so six cm of the cuttings are left above the soil surface.
14. Keep track of the growth of the cuttings and set them in a warm area with indirect sunlight. Water as needed to keep the soil moist to the touch. You may want to teach topics such as phototropism, geotropism, photosynthesis, transpiration, diseases, etc. at this time. Make sure students understand that it will take some time for the cuttings to grow to a size big enough to sell.
15. When the cuttings have strong roots that are about 16 cm long, transplant them to flower pots with all-purpose potting soil. (The students may choose to decorate the flower pots before transplanting.)
16. Ask the students to determine the business details of selling their plants such as: where to sell the plants, what the hours of the plant store will be, and how else they can advertise. Then move on to the next step in the worksheet. The groups need to decide how much the plants will cost. Make sure the students consider the cost involved in creating the potted plants when determining a cost for a buyer. The teacher may want to write each group on the board and write what it costs each group to make one plant. Help the groups determine the cost of one plant. (Remember to figure out the cost for one plant and not all four plants combined!)
17. Have the students complete the worksheet to find out how much money they could make by selling their plants at their determined cost.

Discussion Questions:

1. What is capital?
2. How do most businesses get money to build their business?
3. How does the name of the business and advertising help the business to succeed?
4. What types of expenses do businesses have?
5. What is vegetative propagation?
6. What types of problems might occur in a business?
7. How do the various things one does in a business affect the profit of the business?

Related Activities:

1. Invite owners of small businesses, especially horticulturists or greenhouse operators, into the classroom to discuss economy and how they run their businesses.
2. Write letters to businesses to learn more about them.
3. Talk to greenhouse owners/operators or horticulture teachers to learn more about plant propagation.
4. Visit advertising companies or invite them into the classroom to discuss how advertising impacts a business.

To be used with:
Growing Money

Name ____________________________

Building a Business

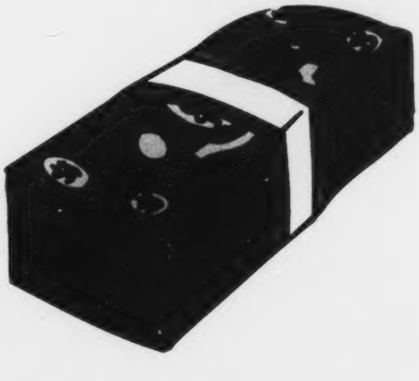
There are many steps in building a business. Use this worksheet as a guideline to get your business started.

1. Decide on a name for your business. Keep in mind the name should reflect what type of business it is. As an example, a good name for an Italian restaurant might be "Mama Rosa's Italian Cuisine." What is the name of your business? _________________________

2. Now you need to get some money to build your business. Your group doesn't have any money saved so you have to apply for a loan from your teacher. This is a pretend loan so you will not actually get the money. Write the amount of money your teacher will let you borrow here: $____________

3. In order to build your business you need supplies. The supplies available and their prices are written on the chalkboard. You need to buy these supplies from the teacher. Write down each item that you purchase, the quantity, and the cost. Then add up the cost of your items, figure out the tax, and then figure the total cost.

Item	**Quantity**	**Cost**
	Subtotal:	
	Tax (7.25%):	
	Total:	



4. After the plants have been propagated and have grown, decide how much you are going to sell the new plants for. When making this decision, think about how much you spent for the plants, flower pots, soil, and other supplies. Figure out what one plant cost to grow. Your teacher will help you with this step. Then write the price you decide upon below. Keep in mind, it needs to be a price that consumers are willing to pay for a plant!
We are going to sell the plants for $______ each.

5. If you sell all four plants at this price, how much money would you make? $_____________

Scientific Careers in Agriculture

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

1. Create an awareness that science involves agriculture.
2. Teach students about the careers available in agriculture.

Students:

1. Learn that there are many jobs related to science in the field of agriculture.
2. Match agricultural occupations to their job descriptions.

Illinois Learning Standards: 13.B.2c; 15.D.2b

Introduction:

You don't have to come from a farm to pursue a position in agriculture. There are ag-related jobs everywhere for anyone! In fact, one out of every six jobs in the United States is related to agriculture. With over 250 career areas available in the field of agriculture the possibilities are numerous. Plus, there is a demand for qualified people to fill these positions. According to the United States Department of Agriculture, more than 57,000 jobs open each year in agriculture.

More than 22 million people have careers in agriculture. Only two million people are traditional farmers, but many people are involved in the process from farm to market. There are agricultural careers in agribusiness, communications, engineering, biotechnology research, government, education, computer science, processing, distribution, marketing, and many other areas. Some people have careers connected to agriculture, but they do not realize it! For example, sales representatives for food distributors, genetic researchers, and elementary teachers who teach topics such as plant and animal systems are all involved in agriculture because their jobs relate to the food and fiber system.

The agricultural industry is made up of six employment areas. These areas are:

Production Specialists - 7%
Social Service Professionals - 9%
Education and Communication - 11%
Managers and Financial Specialists - 13%
Scientists, Engineers, and Related Specialists - 32%
Marketing, Merchandising, and Representatives - 28%

Agricultural Production Specialists consist of careers such as aquaculturalist, turf producer, viticulturist, rancher, farm manager, grain and/or livestock farmer, wildlife manager, greenhouse manager, fruit and vegetable grower, and specialty animal producer.

Social Service Professionals consist of careers such as career counselor, youth program director, dietitian, regulatory agent, community development specialist, regional planner, park manager, food inspector, and outdoor recreation specialist.

Communication and Education Specialists consist of careers such as computer systems analyst, illustrator, journalist, information specialist, personnel development specialist, agriculture/horticulture teacher, public relations representative, computer software designer, and radio/television broadcaster.

Managers and Financial Specialists include careers such as accountant, policy analyst, banker, food service manager, retail manager, consultant, wholesale manager, economist, insurance agency manager, and association manager.

Scientist, Engineers, and Related Specialists include careers such as agronomist, remote sensing specialist, research technician, environmental scientist, landscape architect, food scientist, animal scientist, agricultural engineer, water quality specialist, and plant scientist.

Marketing, Merchandising, and Sales Representatives include careers such as grain merchandiser, insurance agent, sales representative, landscape contractor, restaurant manager, market analyst, commodity broker, export sales manager, advertising manager, and forest products merchandiser.

This lesson is designed to expose the student to the many branches of science and then tie them with the field of agriculture. Farming is not the only career in agriculture. Ag-related careers are all jobs in the system.

Materials Needed:

- "A Career 'Ist' Search" worksheet
- Dictionaries

Activity Outline:

1. Begin by discussing the definition of science. Science is the knowledge gained from the study of the natural world, which includes plants and animals. Studying the natural world includes observations and experimentation.
2. Tie this information to agriculture. Production agriculture is the science, art, and occupation dealing with cultivation of the land, raising crops, and feeding, breeding, and raising livestock while caring for the environment. Explain that there are scientists and researchers who help the farmers grow better crops and raise healthier animals. Help the students make a connection between agriculture and science.
3. Explain to the students that there are many types of scientists in agriculture. Hand out the worksheet "A Career 'Ist' Search." See if the students can use word parts to figure out any of the occupations before they start using dictionaries, etc. Depending on the size of the class and availability of resources, students may work individually, in pairs, or in teams to complete the worksheet.

4. Discuss the worksheet and see what the students know about these careers.
5. If time permits, have each student pick one agriscience career and write a paragraph about why he/she would want that career. Read and share these with other classmates.

Discussion Questions:

1. What is science?
2. What is agriculture?
3. How are science and agriculture related?
4. Discuss the occupations on "A Career 'Ist' Search" worksheet. Ask how people learn these jobs.
5. Ask the students if they know anyone who has a career listed on the worksheet.

Related Activities:

1. Have speakers from these fields come in to talk to your class.
2. Role-play these jobs. Have one student be the career and the other an interviewer.

To be used with:
Scientific Careers in Agriculture

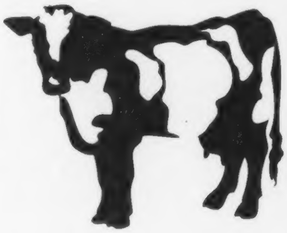
Name ______________________________

A Career "Ist" Search

There are many scientific occupations that are related to agriculture. Match the following careers with their related jobs.

1. ______ Agriculturist
2. ______ Agronomist
3. ______ Anthropologist
4. ______ Apiculturist
5. ______ Bacteriologist
6. ______ Biochemist
7. ______ Biologist
8. ______ Biophysicist
9. ______ Botanist
10. ______ Conservationist
11. ______ Economist
12. ______ Entomologist
13. ______ Geophysicist
14. ______ Horticulturist
15. ______ Hydrologist
16. ______ Meteorologist
17. ______ Microbiologist
18. ______ Zoologist

A. Studies the science of soil and crops
B. Scientific study of plants
C. Studies insects
D. Scientific study of producing crops and raising livestock
E. Studies water
F. Studies the atmosphere
G. Studies the production and distribution of goods and services
H. Studies chemicals in living things
I. Studies animals
J. Studies beekeeping
K. Studies the physics of living things
L. Studies the raising and caring of plants
M. Studies living things seen through a microscope
N. Studies the physics of geology
O. Studies and supports saving the natural environment
P. Studies man
Q. Studies bacteria
R. Studies living things



To be used with:
Scientific Careers in Agriculture

Answer Key

A Career "Ist" Search

There are many scientific occupations that are related to agriculture. Match the following careers with their related jobs.

1. **D** Agriculturist
2. **A** Agronomist
3. **P** Anthropologist
4. **J** Apiculturist
5. **Q** Bacteriologist
6. **H** Biochemist
7. **R** Biologist
8. **K** Biophysicist
9. **B** Botanist
10. **O** Conservationist
11. **G** Economist
12. **C** Entomologist
13. **N** Geophysicist
14. **L** Horticulturist
15. **E** Hydrologist
16. **F** Meteorologist
17. **M** Microbiologist
18. **I** Zoologist

A. Studies the science of soil and crops
B. Scientific study of plants
C. Studies insects
D. Scientific study of producing crops and raising livestock
E. Studies water
F. Studies the atmosphere
G. Studies the production and distribution of goods and services
H. Studies chemicals in living things
I. Studies animals
J. Studies beekeeping
K. Studies the physics of living things
L. Studies the raising and caring of plants
M. Studies living things seen through a microscope
N. Studies the physics of geology
O. Studies and supports saving the natural environment
P. Studies man
Q. Studies bacteria
R. Studies living things

What's in a Label?

Grade Level: 4-6

Approximate Length of Activity: 30 minutes

Objectives:

Teacher:

Combine social studies and Illinois agriculture into a classroom activity in order to help students understand both areas more clearly.

Students:

1. Learn the nutritional value of a candy bar by reading its label.
2. Know the ingredients in a candy bar and where they come from.

Illinois Learning Standards: 15.A.2a; 15.D.2a

Introduction:

What is a candy bar made of and where do these ingredients come from? If you were to look at the list of ingredients, you would find that some of them come from the United States and a few are imported from other countries. How does a company get all of the ingredients to make a candy bar? By importing various products from other countries and from other states!

Some ingredients found in candy bars are corn syrup, milk, butter, and soy lecithin. Milk comes from dairy cattle, cocoa butter is made with milk, corn syrup is made with starch from corn, and soy lecithin is made from the oil in soybeans. (Soy lecithin is an emulsifier that keeps the chocolate and cocoa butter in a candy bar from separating.)

In this lesson, students will research the food label of a candy bar to determine where the ingredients originated. Food labels provide the consumer with information on ingredients, nutritional values, and how the product meets our daily needs of specific vitamins and nutrients. Food labeling became a law in the United States under the Nutrition Labeling and Education Act of 1990. In 1994, the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA) and the Food and Drug Administration (FDA) implemented regulations on nutrition labels. These regulations give specific requirements for the labels' format, nutrient values, nutrient content claims, and health claims.

Materials Needed:

- "What's in My Candy Bar?" worksheet
- Candy bar for each student (Give each student the same type of candy bar to avoid confusion.)
- Encyclopedias and other resource books

Activity Outline:

1. Distribute a candy bar to each student. Have the students read the ingredients on their candy bar.
2. Discuss with the class how the ingredients are grown, transported, processed, and made into a candy bar.
3. Have students complete the "What's in My Candy Bar?" worksheet. Provide encyclopedias and other resource books to help students complete the worksheet.

Discussion Questions:

1. What ingredients did you find on the label that you did not know were in a candy bar?
2. How nutritional is a candy bar? Compare the nutrition information of the candy bar to the daily requirements on the Food Guide Pyramid.
3. Where do candy bar ingredients come from?
4. What types of jobs are involved in the making of a candy bar? (Remember—someone needs to grow the ingredients, transport them, make the product, sell the product, and much more!)

Related Activities:

1. For more information on exports and imports look in *Ag Mag* 5. The magazine is produced by Illinois Farm Bureau® and is available through your county Farm Bureau®.
2. Enlarge a world map and a United States map. Create a bulletin board so students can link where their candy bar ingredients are from (the source) to their hometown. This will give them an idea of the size of the world and the United States and how much we use products from other places.

To be used with:
What's in a Label?

Name ______________________________

What's in My Candy Bar?

1. Find the ingredients. They are listed in order of greatest amount to the least.
What ingredient is used the most?____
What is used the least?____

2. Using an encyclopedia, determine what ingredients are obtained from the United States. Name the ingredients and what state or part of the United States they came from. _______________________

3. Which ingredient is most likely to come from Illinois?_________________________________

4. Which ingredients were imported from another country? Name them and the country or countries they would come from.

5. What are the possible ways the ingredients were shipped to a food processor?

6. Look at the nutrition part of the label.
How many calories are there?______________________
How many calories come from fat?___________________

Nutrition Facts	**Amount/serving**	**%DV***	**Amount/serving**	**%DV***
Serving Size 1 Bar	**Total Fat** 14 g	**22%**	**Total Carb.** 20 g	**7%**
Calories 230	**Sat. Fat** 7 g	**35%**	Dietary Fiber 1 g	**5%**
Fat Cal. 130	**Cholest.** 5 mg	**2%**	Sugars 18 g	
*Percent Daily Values (DV) are based on a 2,000 calorie diet	**Sodium** 35 mg	**2%**	**Protein** 5 g	
	Vitamin A 0% • Vitamin C 0% • Calcium 8% • Iron 4%			

7. Make a fraction comparing fat calories to total calories.____________

Simplify it. ________________
Make it a percent. ________________

8. Read what DV means. How many candy bars would you have to eat to exceed 100 percent of the DV of:

Saturated fat? ______________________________________
Carbohydrates? ______________________________________
Dietary fiber? ______________________________________

9. Look up sodium in the dictionary. What is a synonym for it?______________________________
____

10. Using an encyclopedia, look up calcium, iron, thiamin, riboflavin, and niacin. Define these and name other foods that are good sources of these.

Calcium – ____
Iron – ____
Thiamin – ____
Riboflavin – ____
Niacin – ____

11. Now enjoy your candy bar!

Flying for Agriculture

Grade Level: 4-6

Approximate Length of Activity: Two or three class periods

Objectives:

Teacher:

1. Introduce students to aviation in agriculture.
2. Integrate the topic of agribusiness into language arts by having students use writing and speaking skills.
3. Help students improve reading and listening skills.
4. Guide students in writing structured paragraphs about agricultural aviation.

Students:

1. Become aware of the importance of an agricultural aviation business.
2. Utilize writing and speaking skills to understand aviation agriculture.
3. Write structured paragraphs about agricultural aviation.

Illinois Learning Standards: 3.A.2; 3.B.2b; 3.B.2d; 3.C.2a; 3.C.2b; 4.A.2b

Introduction:

Agricultural aviation has become an economic necessity in the production of quality food. To aid in the existence of this industry, the National Agricultural Aviation Association was organized in 1967. In agriculture, aerial applicators use planes with sprayers to assist growers in crop production management. Aerial applicators can seed and fertilize fields, control diseases, insects and weeds, and apply growth regulants, thereby allowing farmers to greatly increase the quantity and quality of their crop. For ranchers, aerial application is an economic method of controlling insects and weeds in the pasture and managing grasshopper infestations on rangeland. Agricultural aviation is also used to feed and relocate fish. As an agricultural support system, aerial applicators aid in the production of an abundance of high-quality food and fiber.

Under national, state, or local government contracts, ag aviators use their aircraft for varied services which are essential to the nation's well being. Ag pilots are involved in public health programs, including mosquito abatement, controlling fire, insects and disease in forests, eliminating cultivated and wild illegal plants, brush control, and environmental cleanup such as oil spills. This aspect of agricultural aviation deals with maintaining the aesthetic, health, and safety standards to which the American public is accustomed.

Ag pilots and their aircraft are occasionally called upon to enhance the quality of leisure and recreational activities. They provide services to golf courses for snow removal, banner and glider towing operations, and promotion of air shows. These tasks are not necessities for living but are other ways to utilize the pilots and aircraft of the industry. Although agricultural aviation is a diverse industry, its primary purpose is to economically assist in the production of the world's food and fiber supply.

Information taken from the National Agricultural Aviation Association Elementary Curriculum Guide: Critical Assist for the World's Food Supply.

Materials Needed:

- "Profile of An Agricultural Aviation Pilot" handout
- Writing paper for each student

Activity Outline:

1. Explain to the students that agriculture is the science, art, or occupation of cultivating land, raising crops, and feeding, breeding, and raising livestock. There are many more people involved in agriculture than just the producers. For producers to raise crops or livestock, they rely on other people to provide products and services that the producer needs. These types of products and services vary, but are a part of agriculture. Some of the products or services that producers need are implement (tractors, combines, etc.) dealers, feed stores, grain elevators, food processing companies, fertilizer companies, transporters, and veterinarians. One type of service that some producers need is that of agricultural aviation pilots.
2. Using the information from the introduction, explain to the students what agricultural aviation pilots do and why producers need them.
3. Pass out the handout "Profile of An Agricultural Aviation Pilot." Ask a student to read the first paragraph aloud to the class. Then have another student read the second paragraph and so forth until the entire handout has been read.
4. Explain to the students that they are going to write a short paper (one-half to three-fourths of a page) to discuss agricultural aviation pilots. The paper should consist of three paragraphs. The first paragraph is the introduction, the second paragraph is the main body, and the third paragraph is the conclusion. Write the words introduction, main body, and conclusion on the chalkboard. After each word, write a brief description of each. Tell the students that an introduction paragraph introduces the topic the students are writing about. The main body paragraph discusses the main points or opinions the students have on the topic. The concluding paragraph sums up the topic.
5. Leave the descriptions on the chalkboard for students to refer to. Have the students take out two pieces of writing paper. On the first piece of paper students need to write down three main points or opinions of agricultural aviation pilots. They will use these main points in the body paragraph.

6. Now the students are ready to write their papers. In the introduction, the students should discuss what agriculture is and what agricultural aviation pilots do. In the main paragraph have the students write their three main statements and back them up with information they have learned. Then have the students conclude their paper by restating the main parts.

Discussion Questions:

1. What is agriculture?
2. What is an agricultural aviation pilot?
3. How do agricultural aviation pilots help food and fiber producers?
4. What are the three types of paragraphs you used to write your paper?
5. What is an introduction?
6. What is a main body paragraph?
7. What is a conclusion?

Related Activities:

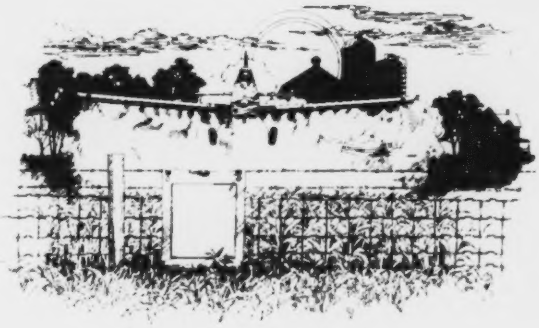
1. Research other businesses that help producers grow crops and raise livestock.
2. Research agricultural aviation pilots and find out if there are any in your county or state.

To be used with:
Flying for Agriculture

Name ______________________________

Profile of An Agricultural Aviation Pilot

Who can be an agricultural aviation pilot?
Anyone can be an ag pilot. Ag pilots just need to love flying and enjoy working in agriculture.



A person needs the proper license, called a commercial pilot's license, before beginning to train as an agricultural aviation pilot. There are a small number of schools in the United States which offer courses and flight training for the career of an agricultural aviator. Many ag pilots train from the ground up. They start by loading agricultural aircraft, flagging fields, and then gradually gain flight experience while working for an agricultural aviation firm.

An ag pilot usually enjoys working in agriculture. He knows all about the crops he flies over and how to assist the growers with problems such as weeds, insects, and plant diseases. An agricultural aviation pilot also needs to have quick reflexes, be in good health, know how to operate a successful business, be knowledgeable about weather, and know how to maintain his or her aircraft. These qualities spell success for an aerial applicator.

What do ag pilots do?
Ag pilots provide a service for the producers of fruits, vegetables, grains, livestock, lumber, cotton, peanuts, Christmas trees, dairy products, and other foods and fibers. They help control pests (insects, weeds, diseases) on the land, seed and fertilize crops, and defoliate (take off the leaves). They assist the growers in economically producing quality food and fiber for the people of the world.

To do the best job possible, agricultural aviators must know how to apply agrichemicals properly. They often learn this information while attending educational seminars to keep their licenses current.

An agricultural aviator uses an agricultural aircraft (helicopter or airplane) to apply the product ordered by the food or fiber producer. The manufacturers build these aircraft to withstand thousands of take offs, turns, and landings in a spraying season. Designed with the safety of the pilot in mind, the cockpit area usually remains intact in the event of an accident. All agricultural aircraft undergo detailed annual inspections by aviation mechanics. For these reasons, few accidents occur in the agricultural aviation industry due to mechanical or design problems. In fact, the industry has a remarkable safety record.

When do ag pilots spray?
Ag pilots spray on a seasonal basis. The food and fiber producers need their assistance prior to planting and through harvest. In the northern United States, ag pilots usually work from late April through September (or when it freezes). In the southern United States, because of the longer growing season, they often work ten or eleven months out of the year.

Agricultural aviation pilots can not always depend on having work. The weather determines their workload. A drought usually means very little work; a wet year usually means more work.

Where do ag pilots work?
Agricultural aviation pilots work where food and fiber products are grown. This is usually in the rural areas of the United States. Most pilots live near their business. Some pilots live in towns or cities and must commute to their job, or move to the area where they work during the spraying season. Many ag pilots who spray only part of the year have other jobs or careers during the off-season. Sometimes the job is aviation related, such as being a charter pilot or aviation mechanic.

Why do ag pilots choose that career?
There are hundreds of reasons why pilots choose a career in agricultural aviation. It is a unique career. There are only 2400 agricultural aviation operations in the Unites States, and approximately 6000 ag pilots. Even though there are so few who choose a career as an ag pilot, they provide an important service to the continued production of food and fiber. There is a great satisfaction in being involved in American agriculture.

Adapted from the National Agricultural Aviation Association Elementary Curriculum Guide: Critical Assist for the World's Food Supply.

Growing Poetry

Grade Level: 4-6

Approximate Length of Activity: One or two class periods

Objectives:

Teacher:

1. Help students improve their vocabulary.
2. Teach students about Illinois agricultural commodities.

Students:

1. Define "commodity."
2. Learn that corn, soybeans, and many more commodities are grown in Illinois.
3. Practice poetry skills using Illinois commodities.

Illinois Learning Standards: 3.C.2a; 5.A.2b; 5.C.2b; 15.A.2a

Introduction:

Illinois is a major agricultural producer of a wide range of commodities. Commodities are goods that are produced. Illinois produces almost 1,130,000,000 bushels of corn, 80,000,000 pounds of apples, 2,500,000 pounds of milk, and 900,000,000 bushels of soybeans each year. Other Illinois products include hogs, wheat, oats, pumpkins, vegetables, Christmas trees, sheep, and much more! Over 76 percent of the land in Illinois is farmland – that's 27.2 million acres!

Crops are produced in different areas of the state because of varying temperatures, precipitation, and physical features of different areas. For some of these same reasons livestock are also raised in certain parts of the state. Fruit trees and berries are grown in southern Illinois rather than northern because the temperatures and frost dates are more appropriate for the crops.

Corn is a major feed grain grown by farmers in Illinois. It is planted in the spring and harvested in the fall. A corn seed weighs about one-hundredth of an ounce. Yet this tiny seed can produce a corn plant that will grow seven to 10 feet tall and produce between 600 and 1000 seeds, like the one from which the plant started. The seeds of a corn plant are the kernels that you find on an ear of corn. The kernels are arranged in rows along the ear. An ear of corn may have as few as eight or as many as 36 rows, but the number of rows is always even. Corn is a major component in many foods like cereals, peanut butter, soda pop, flour, and snack foods. Corn also has many industrial uses such as ethanol, degradable plastics, and starch for recycled paper.

In Illinois, 7339 acres of farmland are used for apple production. Some apple producers grow apples commercially and some grow them noncommercially. Apple producers who grow apples commercially own or manage their orchards and then sell the fruit to consumers. Apple producers prune the trees, apply fertilizers and herbicides, control rodents, mow the orchard, use machinery for harvesting and hauling the fruit, and advertise and sell the crop. Those who grow apples noncommercially may have a few trees in their yard and grow the apples for personal use.

Typically dairy cows are milked two to three times a day by farmers using milking machines. The machines milk the cows using a suction system. When farmers milked cows by hand, they would spend two and one-half hours milking 20 cows. Nowadays, with milking machines, a farmer spends only 15 minutes milking 20 cows. When the cows are milked, the milking machines transport the milk to a bulk milk cooler. A dairy plant sends a refrigerated truck to the dairy farm every few days to transport the milk to a dairy plant where it is pasteurized to kill bacteria. Then some of the milk is packaged into jugs or cartons and sent to stores to be sold. The rest of the milk is used to make butter, cheese, yogurt, whipped cream, ice cream, and other dairy products.

Soybeans are produced for human food, consumer and industrial products, and livestock feed. One bushel of soybeans, which weighs 60 pounds, produces 11 pounds of soybean oil. About 90 percent of this oil is used in the preparation of food products. The remaining 10 percent is used in consumer and industrial products. Soy inks, plastics, biodiesel fuels, and biodegradable building materials are a few of the industrial uses that have been developed using soybean oil instead of petroleum. Soybeans are used in foods such as salad dressings, baking mixes, candy, and more.

Today's producers raise pigs that gain weight more efficiently and yield more lean meat than ever before. Sows, which are female pigs, give birth to litters of piglets twice a year. Each litter usually has seven to 10 piglets. Giving birth to piglets is called farrowing. Some pork producers have "farrow to finish" farms, which means the pigs are bred, born, and fed on the farm until they are taken to market. Pigs are weaned from their mother when they are two to four weeks old. Farmers feed their pigs a well-balanced diet of ground-up corn, soybeans, wheat, and grain sorghum twice a day. They are usually taken to market when they weigh 220-260 pounds. By this time, the pigs are about five to six months old. Bacon, pork sausage, pork chops, and ham all come from pigs, as well as 500 different by-products. Some examples of by-products are fertilizers, glass, china, floor wax, chalk, crayons, and medicine.

Many more commodities than just these are produced in Illinois. Also produced are fruits such as pears, cherries, peaches, strawberries, blueberries, raspberries, grapes, and melons, plus vegetables such as sweet corn, peas, peppers, asparagus, onions, cucumbers, and potatoes. Other animals raised in Illinois include fish, turkeys, chickens, beef cattle, sheep, horses, ostriches, ducks, pheasants, and honeybees. Specialty crops of Illinois include horseradish, herbs, sunflowers, barley, mushrooms, pumpkins, popcorn, and trees. Traditional crops such as wheat and oats are also grown.

Materials Needed:

- *Heartland* by Diane Siebert, ISBN 0-06-443287-4 or *Harvest Year* by Cris Peterson, ISBN 1-56397-571-8 (optional)
- Books and reference materials

Activity Outline:

1. Begin a discussion about Illinois commodities with the class. Explain what a commodity is and talk about what commodities are grown in Illinois. You may want to read *Heartland* by Diane Siebert or *Harvest Year* by Cris Peterson.
2. Explain to the students that they will choose a commodity grown in Illinois and write a poem about it. Take the students to the library to look up books or encyclopedia articles about their chosen commodity.
3. After the students have done a little research on their commodity, have them choose what type of poem they want to write. Students can choose from a cinquain, a haiku, or a rhyming poem. The teacher should write these three types of poems on the board and list the format of each.

Cinquain (5 lines)	Haiku (3 lines)
Noun	5 syllables
Two adjectives	7 syllables
Three "ing" verbs	5 syllables
Short phrase	
Noun (synonym for title)	

Rhyming (as many lines as desired)
Words in different lines must rhyme with each other.

4. After the students have written their poems, have them share their poems with the class.

Discussion Questions:

1. What is a commodity?
2. What are some fruits produced in Illinois?
3. What types of vegetables are produced in Illinois?
4. What is the format of a cinquain?
5. What is the format of a haiku?

Related Activities:

1. Assign one commodity to each student for further research. Have them give either an oral or written report.
2. Put the students' poetry in a book to share with other classes.
3. Make a commodities map of Illinois with pictures showing where various commodities are grown and raised.

DiVine is Fine

Grade Level: 4-6

Approximate Length of Activity: 30 minutes

Objectives:

Teacher:

1. Give students examples of how genes affect humans and plants.
2. Define an adjective and then give examples.
3. Explain how technology affects food.
4. Teach the students about grape production.

Students:

1. Learn about the effect of genes on humans and plants.
2. Learn the definition of an adjective.
3. Use adjectives to describe traits that genes affect in grapes.
4. Learn about grape production.

Illinois Learning Standards: 3.C.2a; 12.A.2a; 13.B.2a; 13.B.2b; 13.B.2c

Introduction:

Genes are in every living organism. They determine characteristics about the organism such as color, height, and more! Every organism has between 50,000 and 100,000 genes. Genes are a segment of a DNA molecule in a chromosome. They determine characteristics by influencing chemical and physical processes during growth and aging. The study of genetics is important in agriculture for crop and livestock improvement, as well as in other areas.

The genes of plants determine their physical uniqueness and characteristics such as height, color, growth, productivity, etc. We are able to grow plants with particular characteristics through genetics. Gene banks are places where many varieties of seeds are preserved. These gene banks help researchers develop new varieties of plants and find improvements.

At one time, all red grapes had seeds. The Agricultural Research Service of the United States Department of Agriculture created a red seedless grape called the Flame Seedless. Recently, they have developed a black seedless grape called the Black Emerald.

Grapes are berries that grow on woody vines. They are a fruit and have a high sugar content. They may be black, blue, golden, green, purple, red, or white. Grapes may be used by wineries, eaten fresh, dried into raisins, made into juice or jelly, or canned. There are two types of grapes – European and North American. European grapes grow in areas with milder climates than the North American grapes. Most of the grapes grown in the United States come from California. In 1997, 13,690,463,378 pounds of grapes were grown in the United States. Of those, 12,404,514,545 were grown in California!

In the winter, 12 to 18 inch cuttings called canes are cut from grapevines. They are buried in moist sand and stored in a cool place until spring. In the spring, the cuttings are planted in a nursery. The cuttings are planted in the vineyard and approximately one year later they develop into vines. The third and fourth year, the grapevines produce a partial crop and afterwards they produce a full crop. Vines may grow 15 to 80 pounds of grapes each year for up to 100 years. Grapes that are eaten fresh are harvested by cutting each cluster by the main stem. Grapes used by wineries or dried for raisins are harvested by hand or machine.

Materials Needed:

- "Grapes are DiVine" worksheet
- Several varieties of grapes

Activity Outline:

1. Show the students some grapes and talk about how they are grown.
2. Tell the students that scientists have been able to produce seedless grapes through biotechnology.
3. Explain to the students that each of them has genes that determine traits like their eye color, hair color, height, and the ability to curl their tongues. Explain that plants, like grapes, have genes too. When scientists find a trait they like, they use the science of genetics, or biotechnology, to produce that trait.
4. Discuss adjectives, or words that describe nouns. Give example adjectives such as brown, ancient, furry, cold, etc.
5. Set the different types of grapes on a table.
6. Ask the students for a few sample adjectives that may describe a particular type of grape. Tell the students that farmers and scientists have put many years into the development of certain traits in foods such as grapes. Talk about the development of seedless grapes.
7. Give each student a "Grapes are DeVine" worksheet. Tell them that they will look at, smell, touch, and eat each type of grape and think of adjectives that describe them. The students will then write five sentences on what they have learned about grapes. Have the students circle the nouns in the sentences, underline the adjectives, and draw a box around the verbs.

Discussion Questions:

1. What is an adjective?
2. What do genes determine?
3. Did all of the grapes have seeds?

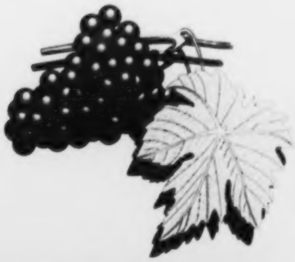
Related Activities:

1. Make grape juice in your classroom.
2. Study the nutritional value of fruit and brainstorm a list of fruits.

To be used with:
DiVine is Fine

Name ______________________________

Grapes are DiVine



Use adjectives to describe the smell, color, and taste of different grape varieties. (Examples: purple, sweet, small, etc.) Use "yes" or "no" to record if the grape variety has seeds.

[redacted]				

Now write five sentences about grapes from what you have learned. When the sentences are written, circle the nouns, underline the adjectives, and draw a box around the verbs.

1. ____

2. ____

3. ____

4. ____

5. ____

Between the Slices

Grade Level: 4-6

Approximate Length of Activity: One to two class periods

Objectives:

Teacher:

1. Introduce students to products grown on a farm and explain how these products are processed into other foods.
2. Help students write a paragraph using transition words.

Students:

1. Identify products grown on a farm and how they are processed into items eaten every day.
2. Write a paragraph using transition words.

Illinois Learning Standards: 3.A.2; 3.B.2c; 3.B.2d; 12.A.2a; 12.B.2a

Introduction:

Today's farmers make it possible for food processors to use quality products such as wheat, pork, and milk to produce the foods we eat and enjoy. But it takes more than the farmer to get these products to our tables. Growing and harvesting crops and raising livestock is only the beginning. It takes thousands of workers to get the agricultural products to our stores and restaurants. Agricultural workers are interdependent, meaning they rely on and support one another. Read below to find out what some products go through to get from the farm to the consumer.

Wheat – A Grain

Winter wheat and spring wheat are grown in various parts of the United States. When the wheat is ready to harvest, farmers use a giant machine called a combine to harvest it. The combine cuts the wheat stalks out of the field and separates the wheat head from the stalk. The wheat head moves into a storage tank on the combine. When the tank gets full, the farmer unloads the combine into trucks or wagons using an auger. An auger is like an arm on the combine. It pushes grain through the combine and into the truck or wagon. The farmer then takes it to the grain elevator.

From there it is shipped by truck, rail, or barge to a terminal, where it is exported or sold to various industries which make feed or food. The place where wheat is shipped to make food is called a mill. The mill breaks the wheat kernels into pieces and sifts the pieces to get the bran and germ (parts of the wheat kernel) out. This is repeated many times to make the substance we know as flour. The miller then adds B-vitamins and iron for nutrients. The flour is shipped in bags to the bakery or grocery store. Bakers use wheat flour because it contains a protein called gluten. To make the dough, active yeast, warm water, and oil are added to the flour. The gluten traps the air bubbles the yeast releases and causes the dough to rise.

Cheese – A Dairy Product

Cheese is a healthy, tasty food that is made from milk. Dairy cows are milked using a milking machine that pumps the milk from the cows into huge storage tanks. These storage tanks cool the milk until refrigerated tank trucks come to pick it up. To begin making milk into cheese, the milk is first heated and quickly cooled. This is called pasteurizing. Pasteurizing is a process that kills any harmful bacteria. The processed milk is then treated to form a soft, custard-like substance called curd. The curd contains a liquid called whey, which must be taken out through a special process before cheese can be made. Special knives cut the curd into thousands of small cubes, and the whey oozes from them. Heating and motion force more whey from the curd. The curd "ball" is then lifted from the vat. The "ball" is broken up into small pieces and put into presses that keep the cheese under great pressure from a few hours to a few days. During pressing, more whey drains out, and the curd is shaped into blocks or wheels. After it is pressed, it is immediately wrapped in plastic. The cheese is then aged in cool storage rooms. The aging times vary for different cheeses. Brick cheese and others need two months to age while Parmesan cheese requires about a year. After being aged, the cheese is packaged in a wide variety of shapes and sizes.

Bologna and Ham – Pork Products

Pigs go to market when they are five to six months old and weigh 240-260 pounds. Pigs may be sold at an auction market, sale barn, or may be bought directly by an order buyer who buys for a packer. Meat inspectors employed by the United States Department of Agriculture inspect live pigs, pig carcasses, and the entire packing plant to make sure that pork is safe to eat. Pork is sold as fresh or processed meat. Fresh meat is sausage, pork chops, and roasts. Processed meat is salami, hot dogs, pepperoni, bologna, and luncheon ham. Processed meats are cured with salt and then smoked, baked, or dried. About half of the pork produced in the United States is sold in supermarkets. The other half is eaten at restaurants, hospitals, schools, and business cafeterias.

Materials Needed:

- "Between The Slices Kids' Facts" worksheet
- "Vocabulary Match-Up" worksheet
- "Secret Sandwiches" worksheet
- Items for making sandwiches (bread, mayonnaise, mustard, lunch meat, cheese, peanut butter, jelly, lettuce, tomatoes, etc.) (optional)
- Plastic knives (optional)
- Napkins (optional)

Activity Outline:

1. Ask the students if they know how the food grown and raised on a farm gets to them. Using the introductory information, help the students understand the processes that food goes through.
2. Read the "Between the Slices Kids' Facts" worksheet with the class.
3. Discuss how food processing is the changing or preparing of food by special treatment. Hand out the worksheet "Vocabulary Match-Up." Have the students complete the worksheet and then go over the answers with the class.
4. Next, have the students write a paragraph describing how to make their favorite sandwich. Remind students to use transition words in their writing such as next, first, second, and finally.
5. Pass out the "Secret Sandwiches" worksheet. Have the students figure out what type of sandwich each child ate.

Discussion Questions:

1. What is food processing?
2. Explain how food gets from the farm to the grocery store.
3. How is wheat processed into flour?
4. How is milk taken to a dairy plant?
5. How is pork cured into processed meat?

Related Activities:

1. Have students write persuasive essays or paragraphs. (Example: a bologna and cheese sandwich is better than a peanut butter sandwich...)
2. Have students write letters inquiring about food-processing techniques. Write to ask how peanuts, fruit, or meat is processed. Think of name brand foods and write to the companies that produce them.

To be used with:
Between the Slices

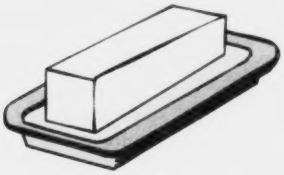
Name ______________________________

Between The Slices Kids' Facts

Wheat – A Grain – Grown On A Plant
Grains must be processed before people can eat them. Some grains are fed to livestock after they are harvested. In addition to bread, what else can wheat be made into?

Bologna – From Hogs Or Beef – Livestock
Glue, leather, gelatin, medicines, upholstery, and fertilizer are only a few of the by-products we get from these animals. Can you name some other meats we enjoy that come from hogs and beef cattle?

Egg Salad – From Chicken Eggs – Poultry
Chickens can lay approximately 250 eggs each year. Egg whites are used in glue and egg yolks are used in shampoos. We also raise chickens for their meat. In addition to egg salad, how else do we prepare eggs?



Cheese And Butter – Dairy Products
Milk comes from dairy cattle. It is high in calcium which builds strong bones. Many other products are made from milk. What are some other dairy products?

LESS SUGAR
CREAMY Peanut Butter

Peanut Butter – From A Plant – The Seed
Peanuts grow in a pod under the ground. These types of plants are called legumes. Oil is also extracted from the peanut. Can you name some other seeds we can eat?

GRAPE JELLY

Jelly – From A Plant – The Fruit
Jelly is made from different fruits. In addition to jelly and jam, fruit can be dried, made into juice, or just enjoyed fresh. Name some flavors of jelly or jam you especially enjoy.

Adapted from SLICE – Student Lessons in Consumer Education, K-6 Classroom Activity Kit by the National Farm-City Council, Inc.

To be used with:
Between the Slices

Name ______________________________

Vocabulary Match-Up

Directions: Match the vocabulary word to the correct definition. Write the correct letter in the blank before the vocabulary word. There will be two definitions left over.

1. _____ Agriculture
2. _____ Consumer
3. _____ Food processors
4. _____ Producer
5. _____ Interdependent
6. _____ Distributors
7. _____ Marketing

a. to rely or support one another
b. the process of selling and making goods available
c. companies that sell and market goods
d. the science of producing crops and raising livestock
e. items used in making a sandwich
f. a person who buys and uses goods
g. a person who grows agricultural products
h. a crop grown by a farmer
i. companies that change raw products (corn, wheat, milk) into other products (chips, bread, butter)

To be used with:
Between the Slices

Answer Key

Vocabulary Match-Up

Directions: Match the vocabulary word to the correct definition. Write the correct letter in the blank before the vocabulary word. There will be two definitions left over.

1. **d** Agriculture
2. **f** Consumer
3. **i** Food processors
4. **g** Producer
5. **a** Interdependent
6. **c** Distributors
7. **b** Marketing

a. to rely or support one another

b. the process of selling and making goods available

c. companies that sell and market goods

d. the science of producing crops and raising livestock

e. items used in making a sandwich

f. a person who buys and uses goods

g. a person who grows agricultural products

h. a crop grown by a farmer

i. companies that change raw products (corn, wheat, milk) into other products (chips, bread, butter)

To be used with:
Between the Slices

Name ____________________________

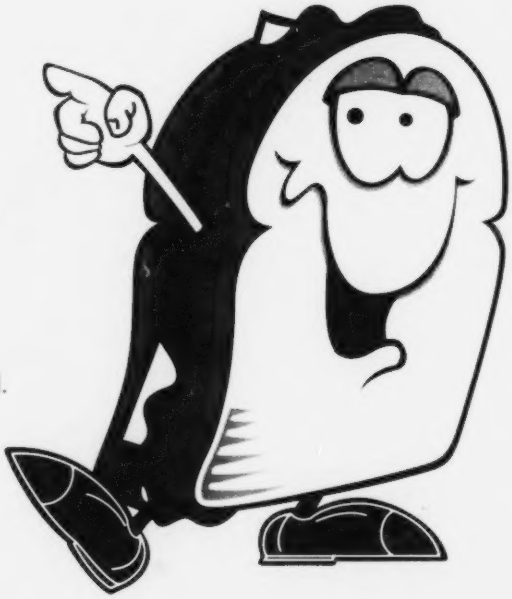
Secret Sandwiches

Four classmates, Sara, Sam, Sally, and Steven, enjoyed their favorite sandwich for lunch yesterday. Each child had a different sandwich. Can you match the child with the correct sandwich?

	Peanut Butter and Jelly	**Bologna**	**Egg Salad**	**Ham & Cheese**
Sara				
Sam				
Sally				
Steven				

Clues:

1. Sam had two different ingredients on his sandwich.
2. Sara sat next to the boy who was eating the Ham and Cheese sandwich.
3. Steven's sandwich was not made with meat.
4. Sally always eats potato chips with her Egg Salad.



Adapted from SLICE – Student Lessons in Consumer Education, K-6 Classroom Activity Kit by the National Farm-City Council, Inc.

WS- 147

To be used with:
Between the Slices

Answer Key

Secret Sandwiches

Four classmates, Sara, Sam, Sally, and Steven, enjoyed their favorite sandwich for lunch yesterday. Each child had a different sandwich. Can you match the child with the correct sandwich?

	Peanut Butter and Jelly	**Bologna**	**Egg Salad**	**Ham & Cheese**
Sara		X		
Sam				X
Sally			X	
Steven	X			

Clues:

1. Sam had two different ingredients on his sandwich.
2. Sara sat next to the boy who was eating the Ham and Cheese sandwich.
3. Steven's sandwich was not made with meat.
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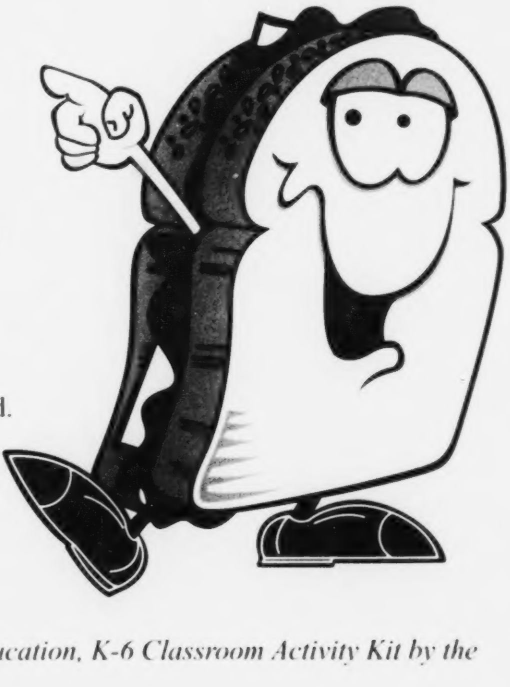


Adapted from SLICE – Student Lessons in Consumer Education, K-6 Classroom Activity Kit by the National Farm-City Council, Inc.

Ecosystem Biodiversity

Grade Level: 4-6

Approximate Length of Activity: Five to ten class periods

Objectives:

Teacher:

1. Provide an opportunity for students to do research in the classroom, school, or community library.
2. Supervise groups of students and act as a facilitator as students research and prepare presentations.
3. Allow time and freedom for students to creatively share their knowledge.
4. Lead the discussion on what might happen under different climate conditions.

Students:

1. Find and utilize resources to research an assigned ecosystem.
2. Learn about plants, animals, and insects, and how they have adapted to the climate of the assigned ecosystem.
3. Use gathered information to develop a presentation to teach the rest of the class about the assigned ecosystem.
4. Present the information clearly and creatively.
5. Listen and take notes on others' presentations.
6. Use knowledge and critical thinking skills to participate positively in the class discussion.

Illinois Learning Standards: 3.B.2a; 3.B.2b; 4.A.2a; 4.B.2a; 4.B.2b; 4.B.2c; 5.A.2a; 5.A.2b; 5.B.2a; 5.B.2b; 5.C.2b

Introduction:

John Muir, a noted conservationist of the 1800s, said, "When we try to pick out anything by itself, we find it hitched to everything else in the universe." In this statement he was emphasizing that all living things are both interrelated and interdependent. These connections of living organisms and nonliving organisms within a particular environment are called ecosystems.

Ecology is the branch of science that deals with the relationships living things have to each other and to their environment. All living and nonliving things depend upon one another in some way to survive. Scientists who study these relationships are called ecologists.

Ecologists study the natural world through three types of groups. These groups are populations, communities, and ecosystems. A population is all of the individuals of one species that live in a given area. A community is a group of interacting populations living together in the same environment. An ecosystem is all of the communities and their nonliving environment.

Ecosystems have six main parts that make up or affect it. They are the sun, abiotic substances (non-living things such as water or climate), primary producers, primary consumers, secondary consumers, and decomposers. The sun and abiotic substances provide the energy for primary producers to grow. The sun provides sunlight, and abiotic substances provide nutrients such as water. The primary consumers are the animals that eat the plants (the primary producers). The predators – the animals that eat other animals – are the secondary consumers. Bacteria and fungi are the decomposers that break down dead plants and animals to become nutrients in the soil.

Changes occur all of the time in ecosystems. The changes occur daily, seasonally, or over many years. Ecosystems tend to remain in balance unless altered by humans or natural events such as hurricanes, floods, or droughts. Sometimes people impact many ecosystems in order to obtain a desired product or satisfy basic needs for food, shelter, and clothing. The habitats of any ecosystem can be protected by responsible human decisions about how we live, produce food, and use energy. Ecologists are concerned about the rate at which nonrenewable resources such as coal, gas, and petroleum are being depleted from our environment. However, many new uses for soybeans and corn in the agricultural industry can help these problems.

Some uses of soybeans are biodiesel fuel, soy crayons, and soy ink. These three products are made with soybean oil instead of petroleum. Biodiesel fuel is then mixed with petroleum diesel to reduce the amount of petroleum diesel used. By using soybean oil instead of petroleum we decrease our dependence on petroleum, which is a nonrenewable resource.

Some uses for corn are biodegradable plastics, packaging material, and an alternative fuel called ethanol. Biodegradable plastics and packaging materials (also known as packing peanuts) are made with corn starch and easily break down so they are not harmful to the environment. Ethanol is a fuel made with corn oil. By using an ethanol-blend fuel, hazardous carbon monoxide emissions are reduced by 25-30 percent.

This lesson involves using research skills as students work collaboratively to develop a presentation about a desert, tropical rainforest, or midlatitude temperate climate (climate similar to that of Illinois). The research will include plant, animal, and insect life as well as their adaptations due to the ecosystem's climate. After all presentations, students will participate in a class discussion based on hypothetical climatic changes.

Materials Needed:

- A variety of resource materials that include plant, animal, and insect life of desert, tropical rainforest, and midlatitude temperate ecosystems as well as their climates. Encyclopedias may be used alone if other resources are unavailable, but copies of articles may be needed for each group member if only one set of encyclopedias is available.

Activity Outline:

1. Divide students into three groups and assign each group either a desert, tropical rainforest, or midlatitude temperate ecosystem. Groups may choose to divide up topics so one or two students researches either the plants, animals, insects, or climate information. Then students can share the information within their groups.
2. Either provide encyclopedias or resource materials in the classroom, or allow time for students to search for appropriate resources in a library or using the Internet.
3. Allow student groups to read material, take notes, and share knowledge gained within their group.
4. Once students feel comfortable with the amount of information gathered, they will decide how they would like to present the material about their ecosystem to the class. Transparencies, technological presentations, posters, songs, skits, etc. are a few possibilities.
5. All students must be involved in the final presentation. Students should practice within their groups so all members are comfortable with what they will be doing.
6. Students should present their ecosystem to the rest of the class while the others listen carefully and take notes on the information shared. All groups will give a presentation so students will have notes on the ecosystems they did not research.

Discussion Questions:

1. What might happen if the ecosystem was changed by decreased water? Decreased sunlight? Increased water? Increased sunlight? Encourage students to give reasons for each of their answers.
2. Stress how life specifically adapts to its environment. Discuss certain adaptations that have occurred in each ecosystem.
3. What ways does agriculture help reduce pollution and lessen our dependence upon nonrenewable resources?

Related Activities:

1. Require groups to present their information in at least two formats. (i.e. display and orally, or skit and posters)
2. In science class, before assigning the research topics, discuss adaptations and the need for them.

Horticulture Goes to Press

Grade Level: 4-6

Approximate Length of Activity: Three to four class periods

Objectives:

Teacher:

1. Instruct the class about techniques of writing a newspaper article.
2. Interest students in horticulture careers.

Students:

1. Learn more about horticulture and the careers involved in horticulture.
2. Write an article about a career in horticulture to be included in a newspaper.

Illinois Learning Standards: 3.A.2; 3.B.2b; 3.B.2d; 3.C.2a; 3.C.2b; 5.A.2b; 5.C.2a

Introduction:

You don't have to come from a farm to pursue a position in agriculture. There are ag-related jobs everywhere for anyone! In fact, one out of every six jobs in the United States is related to agriculture. With over 250 career areas available in the field of agriculture, the possibilities are numerous. Plus there is a demand for qualified people to fill these positions. According to the United States Department of Agriculture, over 57,000 jobs open each year in agriculture.

More than 22 million people have careers in agriculture. Only two million people are involved in production agriculture, but many people are involved in the process of farm to market. There are agricultural careers in agribusiness, communications, engineering, biotechnology research, government, education, computer science, processing, distribution, marketing, and many other areas. Some people already have careers connected to agriculture, but they do not realize it! For example, sales representatives for food distributors, genetic researchers, elementary teachers who teach topics such as plant and animal systems, and landscape architects are all related to agriculture because their jobs relate to the food and fiber system.

Horticulture is the branch of agriculture which involves the production and use of fruits, vegetables, and ornamental plants. It includes the study of trees, flowers, shrubs, vines, and grasses. There is a wide variety of careers open to individuals who have interests in these areas.

This project will help students research and learn more about these specific fields. In doing so, they will also develop their writing skills by writing articles for a newspaper. By reading the paper, other students will learn about careers in these areas.

Occupations related to horticulture include:

Agronomist
Arboriculturist
Biochemist
Botanist
Consultant
Cooperative Extension Agent
Educator
Farm Manager
Floriculturist
Forester
Forestry Technician
Fruit Farmer
Fruit Manager
Greens Keeper
Grounds Manager
Horticulturist
Landscape Architect
Landscape Gardener
Nursery Manager
Orchardist
Park Ranger
Plant Breeder
Research Horticulturist
Soil Conservationist
Soil Scientist
Vegetable Farmer

Materials Needed:

- Research material
- Newspapers for samples

Activity Outline:

1. Discuss what horticulture is and what careers are available in the horticulture industry.
2. Next, have the students look at newspapers and discuss the elements of a good newspaper.
3. The teacher should help the students understand what the important writing techniques are for creating a newspaper article. Explain to the students that each article needs to answer the questions who, what, when, where, and why.
4. Have the students research a given career in horticulture and write an article for the newspaper. The student may receive information by researching books and publications, interviewing someone who works in such a field, or using the Internet.
5. Have students compile their articles to make a newspaper. Students can add weather summaries, horticulture-related ads, etc., to the newspaper. As a class, the students also need to think of a name for the newspaper.

Discussion Questions:

1. What is horticulture?
2. How is horticulture a part of agriculture?
3. What do people in these occupations do for a living?
4. How do such people help our world?
5. Would you like to have a career in this area?
6. What can the creator of a newspaper do to catch their readers' attention?
7. How could we improve our newspaper?

Related Activities:

1. Continue writing the newspaper using other careers in agriculture to inform other students.
2. Ask people with occupations in horticulture to speak to the class. Write about their visits in the newspaper.
3. Interview people in the field about their work and include it in the paper.
4. Visit the sites where horticulturists work and inform the public about their contributions to society.

We're In This Together

Grade Level: 4-6

Approximate Length of Activity: One to two class periods

Objectives:

Teacher:

1. Help students understand what an assembly line is.
2. Assist students in evaluating the benefits and drawbacks of an assembly line.

Students:

1. Become knowledgeable about the process of an assembly line.
2. Use standard measurements to determine the amounts of ingredients in a mixture.
3. Be able to name the steps in an assembly line in a written format.
4. Become aware of reasons for and against an assembly line process.

Illinois Learning Standards: 3.C.2a; 5.C.2a; 7.A.2a; 13.B.2b; 13.B.2c; 15.D.2b

Introduction:

Today's farmers make it possible for food processors to use quality products such as wheat, pork, and milk to produce the foods we eat and enjoy. But it takes more than the farmer to get these products to our tables. Growing and harvesting crops and raising livestock is only the beginning. It takes thousands of workers to get the agricultural products to our stores and restaurants. Agricultural workers are interdependent, meaning they rely on and support one another.

Assembly lines consist of a group of work areas arranged in a certain order to make a product. At each work area, also known as a station, a task is performed on a unit of a product. Then the unit is passed on to the next work station for another task to be performed. When the unit reaches the end of the assembly line, it is a finished product. Sometimes people perform the tasks on assembly lines, but sometimes machines perform the tasks. Machines are often used for efficiency and consistency, but humans are also needed for things such as quality control and management.

Many foods you have in your home were packaged in an assembly line. Cereals, chips, cookies, crackers, canned goods, and many more items are packaged along an assembly line so each product is distributed evenly. Equipment and machinery manufacturers also use assembly lines to efficiently produce farm equipment.

Materials Needed:

- Raisins
- M & M's
- Peanuts (approximately one pound)
- Plastic resealable bags
- Many 1/4 measuring cups
- Paper and pencil

Recipe for "Party Mix"

1/4 cup each of raisins, M & M's, and peanuts

Activity Outline:

1. This activity should begin with a discussion of an assembly line to see what the students already know. General history should be mentioned. Before the late 1800s, products were made one at a time, probably by a single person. It was time consuming, and quality depended on that one person. Specialized jobs began when factories were made. These specialized jobs took the form of an assembly line. Henry Ford's assembly line made the Model T car affordable to the public. Ask students to name products that they think are made on an assembly line. Besides cars, appliances, and clothing, hopefully they will name food products. If not, lead the discussion in this direction and then inform the students that they are going to make a food product on an assembly line.
2. a. Divide the class in half to make bags of "Party Mix." Within one-half of the class, separate the students in groups of three. One half of the class will be doing an assembly line. One person will be the peanut person, one will be the M & M person, and the other the raisin person. Each person measures out one-fourth cup of their ingredient. The first person starts, measures, pours his or her ingredient into the bag, and passes it on to the next person. The last person seals the bag and shakes it to mix the ingredients together.

   b. With the other half of the class, each student does all of the measuring himself. He will measure the peanuts and put them into a bag, measure the M & M's and put them into a bag, and measure the raisins and put them into a bag, and seal and shake the bag. Ask the students to act as machines in this scenario. Remind them that machines are programmed to do tasks consistently, efficiently, and evenly.
3. When complete, have a discussion about the process. Ask about efficiency and quality control. Ask the students how acting as machines made this process different than if performed by humans. Explain that this is a simple assembly line. Both groups might have finished at the same time. Ask what would happen if the product were more complicated. Ask about doing the same task over and over. Ask how assembly lines are changing in the twenty-first century. (Machines are doing the work!)

4. Have the students write down the directions for making the "Party Mix." This should be done in a sequencing format.

Discussion Questions:

1. What types of products are made on assembly lines?
2. What are the benefits and drawbacks of assembly lines?
3. If you managed a factory, would you use assembly lines?

Related Activities:

1. Go on a field trip to a factory that uses an assembly line process. Are there both humans and machines doing the work?
2. Make a nutrition label for your "Party Mix." Make the label by figuring out the calories, fat, and protein in each bag.
3. Find out where the ingredients came from. Plot these places on a map and discuss how the ingredients were transported to the factory. Calculate the mileage.
4. Sell the product at lunch time. Figure cost and profit margins.
5. Have a debate about the merits of an assembly line.

Food Distribution and Preservation

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

1. Make students aware of the different types of transportation used in the distribution of agricultural products.
2. Help students write an expository essay explaining the different types of distribution and types of preservation used.

Students:

1. Become aware of how agricultural products are made available year-round in the United States.
2. Know that distribution is the transportation and storage of goods.
3. Explain how various types of transportation provide distribution of agricultural products.
4. Understand the different methods of preserving foods.
5. Write an expository essay explaining the different types of transportation used in the distribution of agricultural products.

Illinois Learning Standards: 3.A.2; 3.B.2d; 3.C.2b; 15.A.2a; 15.D.2a

Introduction:

(Be sure that students are aware that agricultural products are grown in different parts of the country. They also need to be aware that some products are grown outside of the United States.)

Distribution is the transportation and storage of goods. Because we have a very complex distribution system, we are able to enjoy a wide variety of quality products. Food is transported from where it is grown to the supermarket, thanks to various people who work in distribution.

Whether it is to a local processing plant or a distant market, livestock, crops, fruits, turf grass, and other agricultural products most often leave their production site on a truck. This would be on a large farm truck or a semitrailer.

When the initial trip from the farm is complete, the types of transportation begin to change dramatically. Grains are usually moved from the local elevator to a processing plant or an export terminal by railroad car or barge. Products that need to be refrigerated or frozen, such as meat, milk, and vegetables, must travel in special rail cars or trucks with refrigerators to keep them cold. Products which spoil very quickly, such as fresh-cut flowers and fresh seafood, are distributed by airplane.

When food is distributed from where it is grown, it must be preserved. Because of preservation, we can enjoy different foods year-round rather than just at the time they are harvested. Some of the types of preservation are refrigeration, heat, drying, and chemical.

Glossary:

Export:	To send goods out of the U.S. for trade or sale.
Import:	To bring goods in to the U.S. that were purchased from a foreign country.
Preserve:	To maintain a product's quality, condition, and safety.

Materials Needed:

- "Agricultural Travel" worksheet
- "Food for Keeps" worksheet

Activity Outline:

1. Discuss the background information and the glossary terms with students.
2. Hand out the worksheet, "Agricultural Travel" and discuss the ways foods are transported.
3. Have the students make a list of food items they purchase at the grocery store. Then have the students identify how each product is transported to the grocery store.
4. Hand out the worksheet "Food for Keeps." Discuss how each one of the foods is preserved so it reaches the grocery store ready for use by the consumer.
5. Return to the list generated by the students, and discuss the ways of preserving each of the products.
6. Assign an expository essay to each student. The essay should explain the different methods of food distribution and food preservation.

Discussion Questions:

1. What are the different methods of transporting products?
2. Give examples of what types of products are transported by each method.
3. Why are each of these products transported this way?
4. What are some of the different methods of preserving foods?
5. How do you store various foods at home (i.e. cereal, milk, ice cream, fruit, canned goods)?

Related Activities:

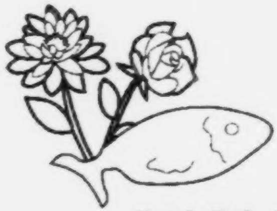
1. Write a poem about the different ways that products are distributed.
2. Research foods that are distributed and preserved from foreign countries and the ways in which this is done.
3. Create a diorama of a product being distributed by one of the forms of transportation discussed.

Lesson adapted from the National FFA Organization's Food for America Resource Guide. Copyright 1996 National FFA Organization. Reprinted with permission of the National FFA Organization.

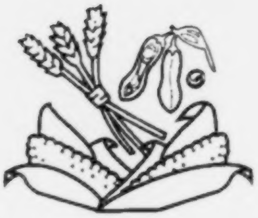
To be used with:
Food Distribution and Preservation Name ____________________________

Agricultural Travel

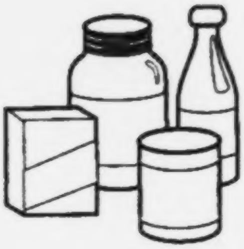
Draw a line from the foods to their most common method of travel.



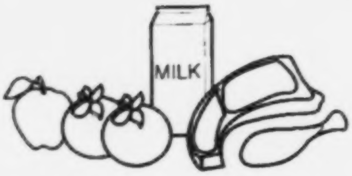
Fresh Fish/Flowers



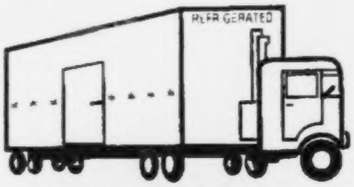
Wheat, Corn, and Soybeans



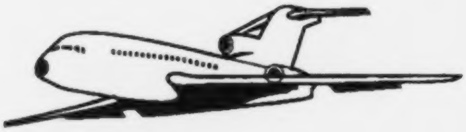
Packaged Foods



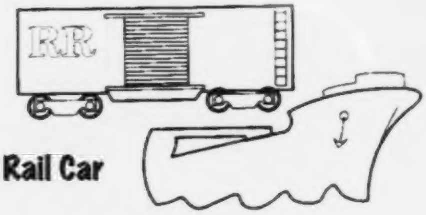
Meat, Milk, Fruits, Vegetables



Refrigerated Truck

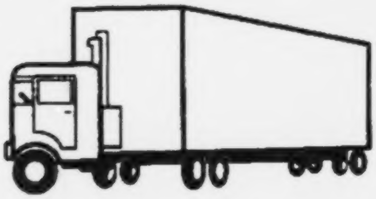


Airplane



Rail Car

River Barge



Semi Truck

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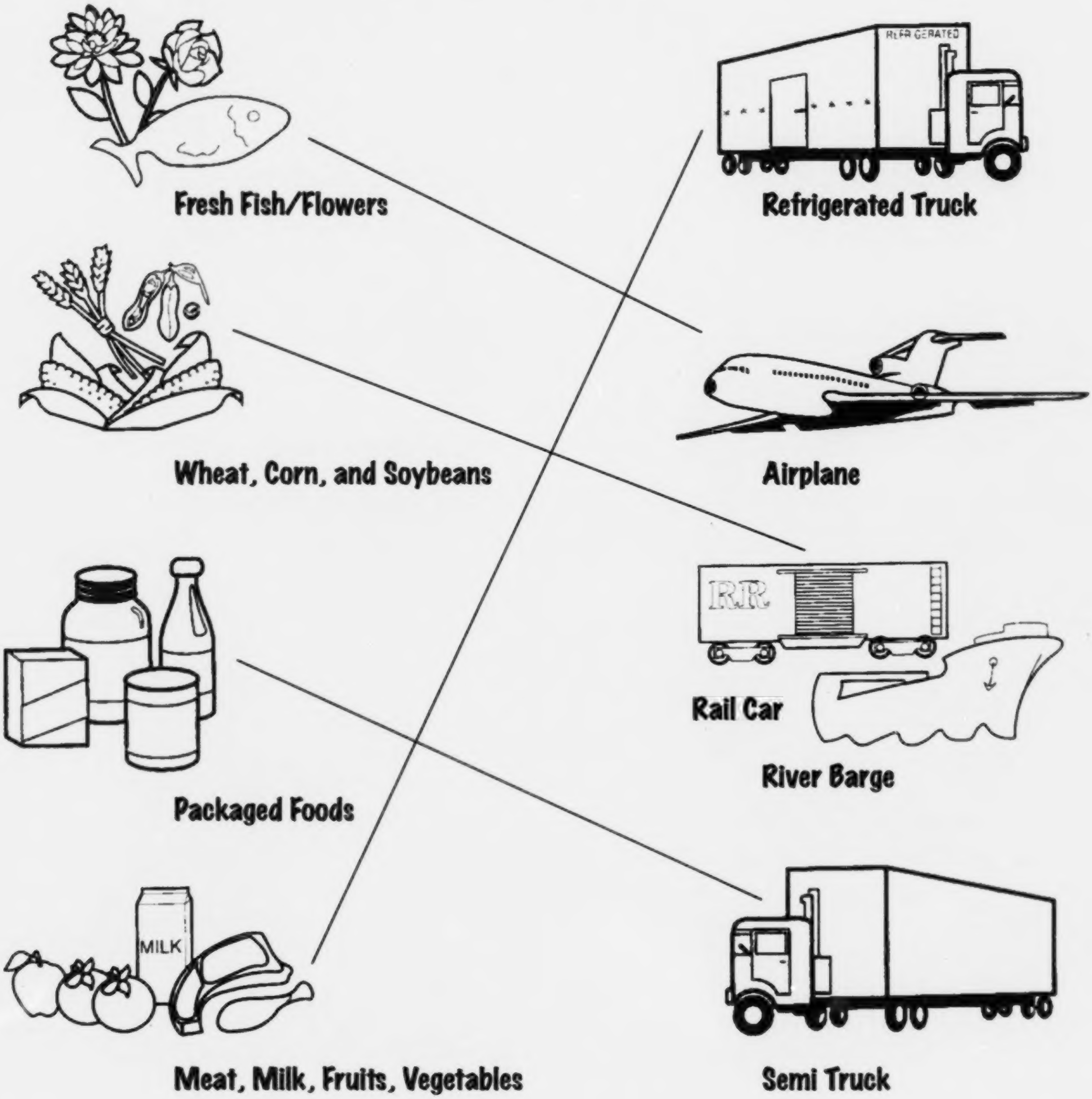
To be used with:
Food Distribution and Preservation **Answer Key**

Agricultural Travel

Draw a line from the foods to their most common method of travel.



Fresh Fish/Flowers
Refrigerated Truck
Wheat, Corn, and Soybeans
Airplane
RLFR GERATED
RR
Rail Car
River Barge
Packaged Foods
MILK
Meat, Milk, Fruits, Vegetables
Semi Truck

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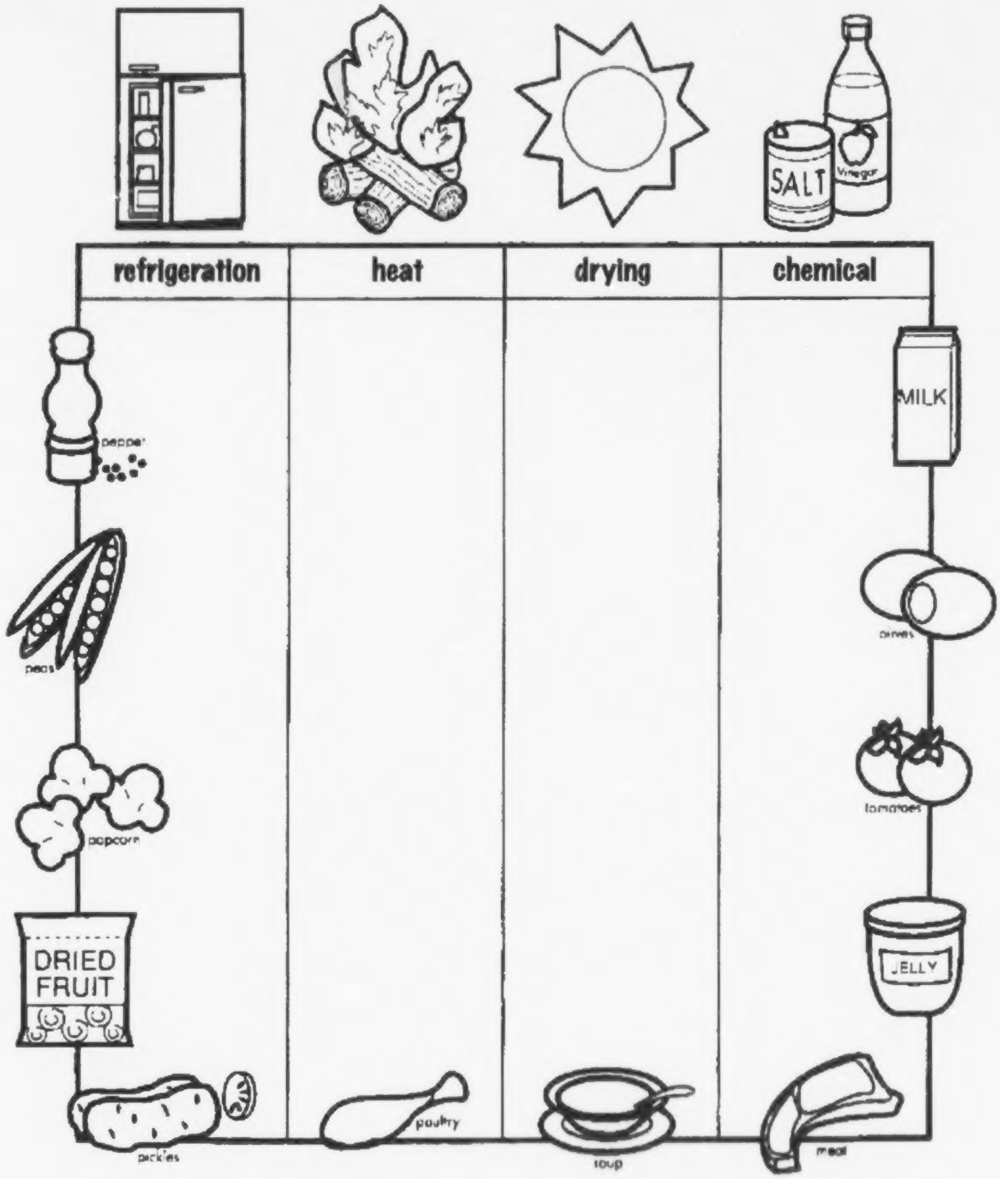
To be used with:
Food Distribution and Preservation Name ______________________

Food For Keeps

Food must be preserved so it will not spoil as it's being moved from one place to another. This picture shows some foods and four ways to preserve them. Write the names of the foods under the picture of the way each is preserved.


SALT
Vinegar
pepper
MILK
peas
olives
popcorn
tomatoes
DRIED FRUIT
JELLY
pickles
poultry
soup
meat

refrigeration	heat	drying	chemical

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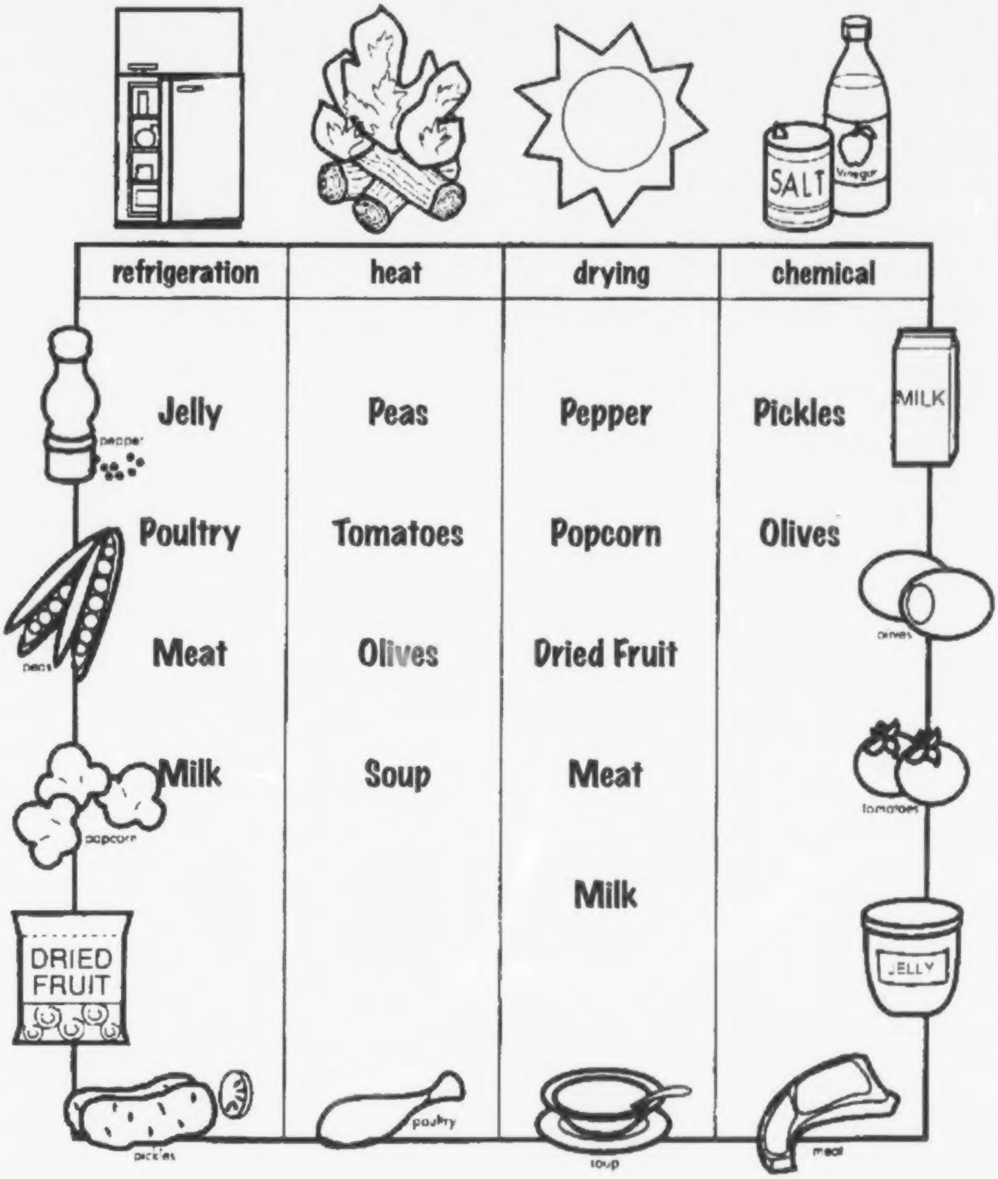
To be used with:
Food Distribution and Preservation

Answer Key

Food For Keeps

Food must be preserved so it will not spoil as it's being moved from one place to another. This picture shows some foods and four ways to preserve them. Write the names of the foods under the picture of the way each is preserved.


SALT
Vinegar
pepper
MILK
peas
olives
popcorn
tomatoes
DRIED FRUIT
JELLY
pickles
poultry
soup
meat

refrigeration	heat	drying	chemical
Jelly	Peas	Pepper	Pickles
Poultry	Tomatoes	Popcorn	Olives
Meat	Olives	Dried Fruit	
Milk	Soup	Meat	
		Milk	

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Picture this Agricultural Career

Grade Level: 4-6

Approximate Length of Activity: Two to three class periods

Objectives:

Teacher:

1. Help the students research a specific agricultural career.
2. Use agricultural career information to conduct an activity.

Students:

1. Conduct research to gain an understanding of the various agricultural careers.
2. Learn about aptitudes for specific agricultural careers.

Illinois Learning Standards: 4.A.2b; 4.B.2d

Introduction:

You don't have to come from a farm to pursue a position in agriculture. There are ag-related jobs everywhere for anyone! In fact, one out of every six jobs in the United States is related to agriculture. With over 250 career areas available in the field of agriculture the possibilities are numerous. Plus, there is a demand for qualified people to fill these positions. According to the United States Department of Agriculture, more than 57,000 jobs open each year in agriculture.

Approximately 22 million people now work in agriculture and ag-related fields. Only 10 percent of them are directly involved in production agriculture. The rest work in agribusiness, communications, science, government, education, processing and distribution, and marketing and sales, as well as dozens of other occupations which serve the farmer or the total agricultural industry.

As new technologies emerge in agriculture, so will new job opportunities and the need for well-trained and educated people. Today's agriculture offers more than 250 rewarding and challenging careers. Agriculture today is so much more than farming. Agriculturists can work in livestock production or soil conservation, equipment repair or radio broadcasting, or anything from nursery management and genetic engineering to landscaping and law.

There are various categories of agricultural careers. This list gives some examples of each.

Agricultural Production – agronomist, animal breeder, aquaculturist, cattle farmer, dairy farmer, mushroom grower, peanut producer, rice farmer, tree farmer, corn farmer and soybean farmer, sheep producer, hog producer

Ag Processing/Distribution – Christmas tree grader, food and drug inspector, fruit distributor, grain broker, meat cutter, quality control supervisor, winery manager

Ag Mechanics/Engineering – ag construction engineer, diesel mechanic, equipment operator, land surveyor, machinist, parts manager, soil engineer, welder

Agribusiness – aerial cropduster, ag equipment dealer, livestock groomer, computer analyst, farm auctioneer, feed ration developer, fertilizer plant supervisor, field sales representative, kennel operator, poultry hatchery manager, salesperson

Resource Management – animal ecologist, environmental conservation officer, forest fire fighter, forest ranger, game warden, ground water geologist, soil conservationist, water resources manager

Ag Research/Health Sciences – animal nutritionist, avian veterinarian, biochemist, botanist, entomologist, food chemist, plant geneticist, pomologist, veterinarian

Horticulture/Forestry – floral designer, forester, golf course superintendent, greenhouse manager, landscape architect, log grader, turf farmer

Ag Specialist – ag accountant, ag corporation executive, ag educator, ag journalist, ag lawyer, ag loan officer, ag market analyst, computer specialist, farm investment manager, rural sociologist

Materials Needed:

- "Careers in Agriculture" worksheet
- "Ag Career Strips" sheets
- Encyclopedias
- Reference materials
- Internet (if available)
- Chalkboard or dry erase board
- Chalk or dry erase markers

Activity Outline:

1. Have students brainstorm careers that are related to agriculture and give some of the background information to the class about agricultural careers.
2. Have each student fill out the "Careers in Agriculture" worksheet. After the students have filled out the first nine responses, have them use these descriptions to identify what skills and level of education are needed in each career listed. Many of the careers require more than one of the choices.
3. Discuss the "Careers in Agriculture" worksheet with the students.
4. Take the "Ag Career Strips" sheet and cut apart the ag careers. Place all the paper strips in a hat.
5. Play Ag Career Pictionary with your class. Divide the class into two teams. Assign one team to be Team A and the other to be Team B.
6. Allow a student from Team A to pull an ag career from the hat. Ask them to draw something that represents that career on the chalk/dry erase board. Team A must guess what career is being represented as the student is drawing. If

Team A guesses correctly within one minute, they will be awarded 20 points. If Team A does not guess correctly, allow Team B 20 seconds to guess the career. If Team B guesses correctly, they will be awarded 10 points.

7. Allow a student from Team B to pull an ag career from the hat and then draw that career on the chalk/dry erase board. Team B must guess what career is being represented as the student is drawing. If Team B guesses correctly within one minute, they will be awarded 20 points. If Team B does not guess correctly, allow Team A 20 seconds to guess the career. If Team A guesses correctly, they will be awarded 10 points.
8. Continue this pattern until all students have had a chance to draw an ag career on the board. The team with the most points wins!

Discussion Questions:

1. Have the students generate questions to the person giving the speech.
2. Which career probably requires the most amount of education? The least?
3. Do you know anyone who has a career in agriculture? What do they do?
4. Which of these careers would you most like and why?

Related Activities:

1. Have students conduct an in-person or phone interview with someone who has an agricultural career. Report the information to the class.
2. Play "Agricultural Charades." Have students take turns acting out the career on the paper drawn from a hat. The other students try to guess what career is being portrayed.

To be used with:
Picture this Agricultural Career

Name ______________________________

Careers in Agriculture

Check the responses which describe you.

I want to:

1. _____ work with other people
2. _____ work with ideas or information
3. _____ work with machines
4. _____ do math and work with numbers
5. _____ do science experiments
6. _____ work with animals
7. _____ work with plants
8. _____ go to college for four years after high school
9. _____ work outdoors

Listed here are just a few of the hundreds of careers in agriculture. Write the number of the description above you think is most needed in each career. You may need to look up some of these careers. Many descriptions may fit in each career.

Agricultural Production

_____ aquaculturist
_____ fruit grower

Agribusiness

_____ meteorological analyst
_____ sales representative

Horticulture/Forestry

_____ forest ranger
_____ landscape architect

Ag Processing/Distribution

_____ food and drug inspector
_____ milk plant supervisor

Resource Management

_____ groundwater geologist
_____ soil conservationist

Ag Specialist

_____ ag economist
_____ ag journalist

Ag Mechanics/Engineering

_____ ag construction engineering
_____ diesel mechanic

Ag Research/Health Sciences

_____ agronomist
_____ entomologist

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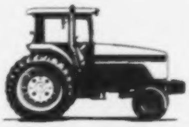
To be used with:
Picture This Agricultural Career

Ag Career Strips

Animal Groomer

Computer Programmer

Equipment Operator


Safety Inspector

Food & Drug Inspector

Meat Inspector

Farmer

Tree Nursery Manager

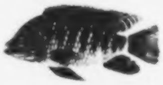
Salesperson

Wholesale Florist

Surveyor

Welder

Fruit & Vegetable Grader

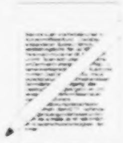
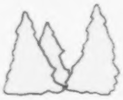
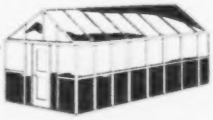
Aquaculturist


Livestock Producer

Vegetable Grower

To be used with:
Picture This Agricultural Career

Ag Career Strips

Biochemist	**Entomologist**
Marine Biologist	**Veterinarian**
Agriculture Educator	**Agriculture Journalist**
Scientific Writer 	**Agriculture Lawyer**
Floral Designer	**Forester** 
Golf Course Manager	**Greenhouse Manager** 
Landscaper	**Game Warden**

Cowing Around

Grade Level: 4-6

Approximate Length of Activity: 45 minutes

Objectives:

Teacher:

1. Give students an understanding of dairy production through discussion, books, and an *Ag Mag* produced by Illinois Farm Bureau®.
2. Help students realize that by adding "s" some words are made plural, but others need different endings.

Students:

1. Learn about the dairy industry in Illinois.
2. Understand the process of producing dairy foods.
3. Show an understanding of singular and plural words by playing the Dairy Plurals game.

Illinois Learning Standards: 1.A.2a; 1.B.2d; 15.D.2b; 17.C.2b

Introduction:

Illinois is a major agricultural producer. In fact, more corn, soybeans, cattle, and hogs are produced here than in just about any other place in the world! Illinois dairy cattle produce 2,500,000 pounds of milk in one year. Each cow produces an average of 15,800 pounds of milk each year. Our state produces 117,036,000 pounds of cheese each year, which is 1.7 percent of the U.S. total. We also produce 35,482,000 pounds of ice cream annually, 3.8 percent of the U.S. total (1997). Dairy production brings 4.1 percent of the cash farm income in Illinois (1994).

Just like humans, dairy cows need to eat a variety of foods. The food that a cow eats affects how much milk she makes. A cow that only eats grass produces about 50 glasses of milk a day. On the other hand, a cow that eats grass, corn, hay, and mixed feed can produce about 100 glasses of milk a day!

The average size of a dairy herd in Illinois is 80 cows, but large commercial dairy farms may have more than 1000 cows. There are many different breeds of dairy cows and each breed varies in the amount and richness of milk produced. Some dairy farmers keep several breeds of cows in the herd in order to maintain a consistent quality and quantity of milk. The Brown Swiss, which weighs about 1500 pounds, is generally the largest breed while the Jersey is usually the smallest at 1000 pounds.

The dairy cow, which must give birth to a calf before beginning to give milk, performs a very important job in our food production industry. Cows change grass and grains into milk—a nearly perfect food. The dairy cow is a ruminant, which means it has four compartments to its stomach. A good milk-producing cow will give 20,000 to 30,000 pounds of milk each year, although most cows give an average of 15,800 pounds per year. Today all milking is done by electric machines which guide the flow of milk from the cow to a very clean refrigerated holding tank.

After the cows are milked and the milk is in the refrigerated tank, an insulated truck comes to the farm and hauls the milk to a dairy plant. After the milk is tested for safety, it is homogenized, pasteurized, and packaged. Milk can also be processed into cheese, yogurt, ice cream or other products at the dairy. Milk products are stored in a refrigerated room and then taken to a grocery store (in a refrigerated truck) for you!

Foods from the milk group on the Food Guide Pyramid are good sources of calcium, protein, riboflavin, and vitamin D. Calcium helps form bones and teeth. It regulates muscle contraction, conducts nerve impulses, and helps guard against blood clots. Riboflavin aids in metabolism, and promotes good vision and healthy skin. Vitamin D aids in the absorption of calcium and phosphorus. Milk, cheese, yogurt, cottage cheese, and ice cream are included in this food group.

Materials Needed:

- "Cow Crazy Crossword" worksheet
- Dairy *Ag Mag* 14 (Contact your county Farm Bureau® to obtain copies for your classroom.)

Activity Outline:

1. Discuss dairy production with your students. You may want to read a book such as *Hooray for Dairy Farming!* by Bobbie Kalman, *Extra Cheese Please!: Mozzarella's Journey from Cow to Pizza* by Cris Peterson, or *The Milk Makers* by Gail Gibbons.
2. Read Dairy *Ag Mag* 14, "Delightful Dairy Moos," from the Illinois Farm Bureau®. Try some of the activities in the *Ag Mag*.
3. Pass out the "Cow Crazy Crossword" worksheet. This worksheet serves as a fun wrap-up to the lesson. Let the students complete it individually or in groups. See who finishes it first!

Discussion Questions:

1. How much milk does an average Illinois cow produce?
2. What does a dairy cow eat?
3. How does milk get to a dairy plant and then to a grocery store?
4. How does cheese get from the cow to your pizza?
5. What does pasteurization mean?
6. What does homogenization mean?
7. Why are dairy cattle ruminants?

Related Activities:

1. Look at pictures of different dairy cattle breeds. Can you tell the difference? Which one is the most popular in the United States?
2. Try this experiment to see what would happen to bones if they did not have any calcium: Put a chicken bone in a jar with tap water. Put another chicken bone in a jar with vinegar. Place the lids on the jars. Remove the bones after two days and try to bend the tip of each bone. What do you notice? Remove the bones two or three days later and bend them in the middle. Try to cut them with scissors. Which one is softer? One of the bones became brittle because it lost calcium. If you don't get enough calcium, this is what your bones will be like!
3. Painted ice cream cones: Using compasses and rulers, draw circles and triangles on white paper to make ice cream cones. Add food coloring to sweetened condensed or evaporated milk to create paint. Sponge-paint the circles and triangles. They will shine and drip—just like real ice cream! After the shapes dry, cut them out and assemble the ice cream cones.
4. Make butter in your classroom: Place one-half pint of room temperature whipping or heavy cream in a plastic or glass jar with a lid. (One-half pint of cream will make about one-fourth pound butter.) Have students shake the jar for five to ten minutes. When a lump of butter forms, pour the contents of the jar into a colander to separate the butter from the buttermilk. Eat the butter on bread or crackers. A pinch of salt can be added.
5. Try this activity to see what milk looks like as it curds: Place one cup of milk in a bowl, add one tablespoon of vinegar, leave the bowl at room temperature for one hour, check the bowl periodically to see curds forming.

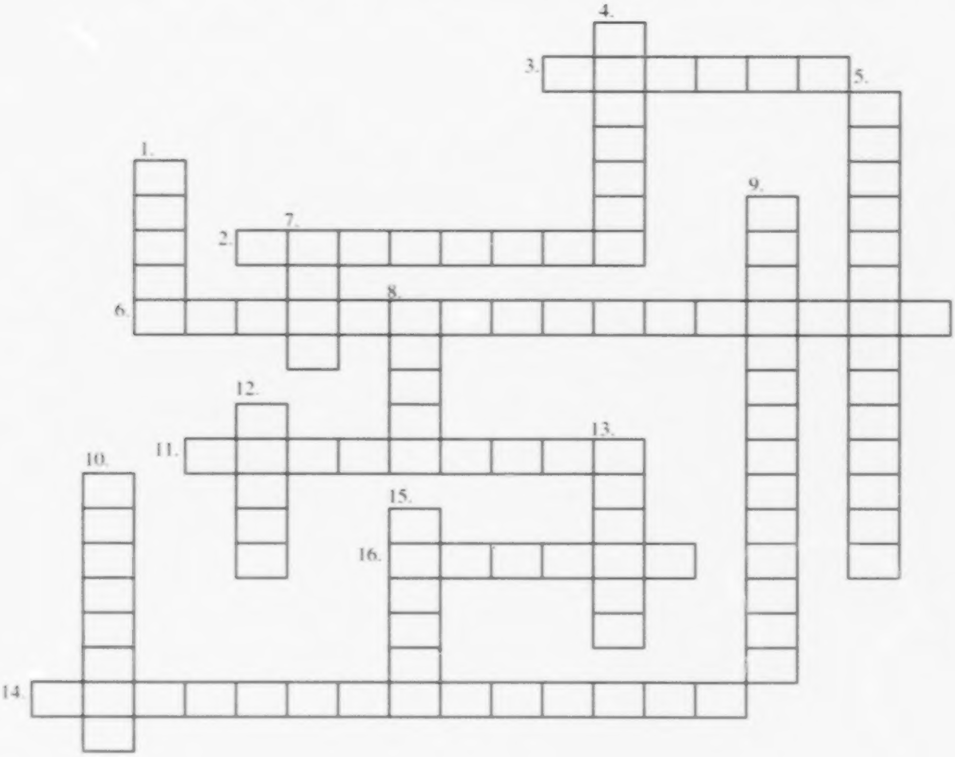
Other Resources:

1. "Dairy Delights - Good Nutrition from Milk" Agriscience Kit, Vocational Agriculture Service, University of Illinois, College of Agriculture, 1401 S. Maryland Drive, Urbana, IL 61801, (217) 333-3871. Call your county Farm Bureau® to find out if a kit is available to borrow.
2. "Vrrrooommm 2! Dairy Farming for Kids" video by Rainbow Communications. Contact your county Farm Bureau® to borrow the video.
3. St. Louis District Dairy Council, 8710 Manchester Road, St. Louis, Missouri, 63144-2793, (314) 961-3100.
4. "Moo-velous Munchies from Different Countries," Dairy Council of Wisconsin, 999 Oakmont Plaza Drive, Suite 510, Westmont, Illinois 60559, 1-800-325-9121.
5. Contact the American Dairy Association of Illinois for more information: 1 West Front Street, El Paso, IL 61738. Ph. (309) 527-4095.
6. Web sites:
    - Milk: www.cesa10.org/explore-WI/gov/milk.html
    - Why Milk?: www.whymilk.com/main.html
    - Milk Fun Facts: www.knudsen-dairies.com/funfacts.htm
    - Dairy Farm: www.ktca.org/newtons/11/dairyfrm.html
    - MooMilk: www.moomilk.com
    - I Love Cheese: www.ilovecheese.com
    - Butter is Best: www.butterisbest.com
    - Dairy Management Inc.: www.dairyinfo.com
    - Brown Swiss: www.brownswiss.com

To be used with:
Cowing Around

Name ______________________________

Cow Crazy Crossword



Down

1. When a calf is born, it drinks milk from its mother's ___________.
4. Milk and milk products provide our bodies with ________________, which makes our bones and teeth strong.
5. _______________________ is the process of breaking up the fat particles in milk so they will be evenly dispersed.
7. The starter causes the milk to _________.
8. When the calf is weaned from its mother, it begins to eat __________, silage, and hay.
9. ______________________ is the process of heating milk very quickly to kill germs and then rapidly cooling it.
10. Dairy products also provide our bodies with protein, carbohydrates, and ________________.
12. Male dairy cattle are called _________ and do not produce milk.
13. Milk is tested for ______________.
15. A bacteria culture, or starter is added to milk when ______________is made.

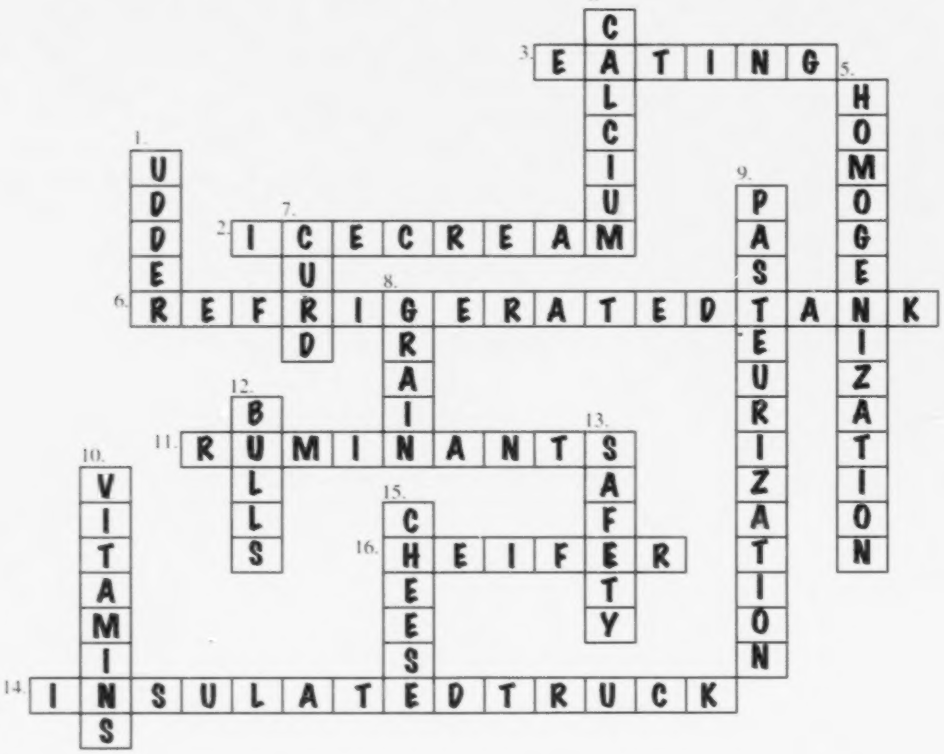
Across

2. Milk can also be processed into yogurt, _____ __________, and other dairy products.
3. Cows spend six and one-half hours a day ___________.
6. After cows are milked, the milk travels to a ________________ __________ through pipes.
11. Dairy cattle are called ________________ because they chew their cud and have four compartments to their stomach.
14. An _______________ ____________ hauls the milk to a dairy plant.
16. A female calf is called a ___________.

To be used with:
Cowing Around

Answer Key

Cow Crazy Crossword


1. UDDER
2. ICECREAM
3. EATING
4. CALCIUM
5. HOMOGENIZATION
6. REFRIGERATEDTANK
7. CURD
8. GRAIN
9. PASTEURIZATION
10. VITAMINS
11. RUMINANTS
12. BULLS
13. SAFETY
14. INSULATEDTRUCK
15. CHEESES
16. HEIFER

Down

1. When a calf is born, it drinks milk from its mother's **udder**.
4. Milk and milk products provide our bodies with **calcium**, which makes our bones and teeth strong.
5. **Homogenization** is the process of breaking up the fat particles in milk so they will be evenly dispersed.
7. The starter causes the milk to **curd**.
8. When the calf is weaned from its mother, it begins to eat **grain**, silage, and hay.
9. **Pasteurization** is the process of heating milk very quickly to kill germs and then rapidly cooling it.
10. Dairy products also provide our bodies with protein, carbohydrates, and **vitamins**.
12. Male dairy cattle are called **bulls** and do not produce milk.
13. Milk is tested for **safety**.
15. A bacteria culture, or starter is added to milk when **cheese** is made.

Across

2. Milk can also be processed into yogurt, **ice cream**, and other dairy products.
3. Cows spend six and one-half hours a day **eating**.
6. After cows are milked, the milk travels to a **refrigerated tank** through pipes.
11. Dairy cattle are called **ruminants** because they chew their cud and have four compartments to their stomach.
14. An **insulated truck** hauls the milk to a dairy plant.
16. A female calf is called a **heifer**.

The Dairy Shoppe

Grade Level: 4-6

Approximate Length of Activity: One or two class periods

Objectives:

Teacher:

1. Provide information about the history of the dairy industry.
2. Help students understand the advancements made in the dairy industry.
3. Teach students about dairy cattle.
4. Help students learn about running a business.

Students:

1. Learn about the history of the dairy industry.
2. Know what advancements have been made in the dairy industry.
3. Learn about dairy cattle.
4. Understand the many aspects involved in running a business.

Illinois Learning Standards: 12.A.2a; 12.B.2a; 15.A.2a; 15.C.2c; 15.D.2b; 18.C.2; 26.B.2d; 27.A.2b

Introduction:

Dairy cows have the ability to change grass and grains, the kind people can't eat, into milk—a nearly perfect food! The dairy cow can do this because she is a ruminant, an animal with four compartments to her stomach. Ruminants do not have any upper front teeth. They eat by wrapping their tongues around their food and pulling it into their mouths.

Dairy cattle were brought to America during the early Viking voyages in the 1000s, Columbus' voyages in 1492, and the colonists' settlements in the early 1600s. When pioneers settled the West, they took dairy cattle with them for milk, cheese, and butter. Later, cities began growing rapidly and it was harder to get milk from the farm to the people in the city. This problem was solved when railroads became a form of transportation. Milk was then transported to many places, some as far as 50 miles away.

Nowadays milk is supplied to consumers daily. Before the late 1600s, milk was only available during the spring, summer, and fall, because cows could feed on pastures during these times of the year. When the colonists began saving some grain and hay for the cattle to eat during the winter, cows started producing milk all year long.

Dairy farming occurs in every state of the United States. However, California, Wisconsin, New York, Minnesota, and Pennsylvania are leading milk-producing states. On today's dairy farms, cows are milked two or three times a day with special milking machines. Farmers, using automated equipment, milk dairy cows and store the fresh milk in a refrigerated tank. The electric milking machine marked the end of the standard milking stool and the tiring job of milking by hand. With just two of these portable milking machines, a farmer can milk a dozen cows in a quarter of the time it used to take by hand.

Dairy farmers are careful to keep the milk clean and avoid exposing it to the open air, which might cause contamination. After the milk is taken from the cows, it is pumped through a clear plastic pipe to a refrigeration tank. Special refrigerated tank trucks then pick the milk up and transport it to the dairy processing plants, where the milk is pasteurized to kill any disease-causing bacteria.

All dairy cows are female and must have a calf before they can produce milk. Heifers are female calves less than one year of age, and after cows reach two years of age they usually give birth to their own calves.

Dairy cows spend six and a half hours a day eating hay, silage, and grain. Silage is fermented corn, wheat, or hay with the stalks and leaves. Cows eat 50 pounds of silage as well as 40 pounds of feed and hay each day, equaling 90 pounds. (The average American only eats four pounds of food a day.) Dairy cows also drink 25–50 gallons of water daily. This food and water turns into about 100 glasses of milk a day.

There are many different breeds of dairy cows and each breed varies in the amount of richness of the milk produced. Some dairy farmers keep several breeds of cows in the herd in order to maintain a consistent quality of milk. Holstein-Friesian cows are large black and white cows. They produce the most milk, but the least butterfat. Holsteins are the most popular breed in this country and adapt to all kinds of climates.

Materials Needed:

- Posterboard
- Markers, crayons, or colored pencils
- Construction paper
- Glue or rubber cement
- Supplies to run the business:
    Chocolate milk (in small cartons)
    White milk (in small cartons)
    Paper or plastic cups
    Ice
    Cooler or ice bucket

Activity Outline:

1. Discuss the background information with the students. Help them learn about dairy cattle and milk production.
2. Next, discuss with the students the elements of running a small business, such as a coffee shop or soda shop. Students will need to know about:

Managers:	Management styles
Kitchen Workers:	Safe food handling/work ethic/responsibility
Counter Workers:	Cleanliness/positive work ethic/responsibility
Cashier:	Honesty/mathematical accuracy
Bookkeepers:	Honesty/recordkeeping
Maintenance:	Cleanliness/positive work ethic/responsibility
Advertising:	Promotion/sales

3. It is important to emphasize how each person has a vital role in the business, and how they must all work as a team for the business to be successful. Ask the students if they would like to open a "specialty drinks stand" called "The Dairy Shoppe" for other students in the school. The stand could serve special drinks such as:

Iced Mocha	Carton of chocolate milk served over a cup of ice.
Double Mocha	Two cartons of chocolate milk at a discounted price served over a cup of ice.
Choco Latte	White and chocolate milk served together over ice.

4. Students can make posters to advertise the sale of their products. The posters should include information such as the name of their business, when and where they will be selling their drinks, and what type of drinks they will be selling.
5. This would be a good opportunity for the students to talk with a local shop owner to learn more about a small business, and what subjects in school the shop owner now finds most helpful. Perhaps the students could write resumes stating their qualifications and experiences, fill out applications, and interview for specific jobs in the small business.

Discussion Questions:

1. How did dairy cattle come to America?
2. Why do dairy cattle now produce milk in the winter?
3. At what age can a dairy cow start producing milk?
4. How did dairy cows used to be milked?
5. How are dairy cows milked today?
6. What is milk stored in at a dairy farm?
7. What do dairy cows eat?

Related Activities:

1. Read more about dairy cattle and conduct the activities found in Illinois Farm Bureau®'s *Ag Mag* 14. Contact your county Farm Bureau® to receive free copies for your classroom.
2. Research the various breeds of dairy cattle and learn what each breed is known for.
3. Place a half pint of whipping cream at room temperature in a plastic or glass jar with a lid to make butter. One-half pint of cream will make about one-quarter pound butter. Shake the jar for five to ten minutes. When a lump of butter forms, pour the contents of the jar into a colander to separate the butter from the buttermilk. Eat the butter on bread or crackers. A pinch of salt can be added.
4. For more information on dairy contact the American Dairy Association of Illinois at 1 West Front Street, El Paso, IL 61738. Ph. (309) 527-4095.
5. Contact your county Farm Bureau® to borrow a copy of the video "Vrrrrooommm 2! Dairy Farming For Kids" by Rainbow Communications.
6. Web sites:
   - www.whymilk.com/main.html
   - www.knudsen-dairies.com/funfacts.htm
   - www.ktca.org/newtons/11/dairyfrm.html
   - www.moomilk.com
   - www.ilovecheese.com
   - www.butterisbest.com
   - www.dairyinfo.com
   - www.brownswiss.com

Corn - An A-Maizing Plant

Grade Level: 4-6

Approximate Length of Activity: Two to three class periods

Objectives:

Teacher:

1. Guide students in a discussion on corn production.
2. Help students understand the history of corn production.

Students:

1. Locate and label the states on a U.S. map that make up the "Corn Belt."
2. Become familiar with the parts of the corn kernel.
3. Recognize products made from corn used in their daily lives.
4. Be able to distinguish, through dissection, the four different parts of a corn kernel.

Illinois Learning Standards: 17.A.2a; 17.A.2b; 17.C.2b

Introduction:

The Corn Belt is a group of states where most of the corn in the United States is produced. Illinois, Iowa, Nebraska, and Minnesota produce 50 percent of all the corn grown in the U.S. Other major corn growing states include Indiana, Wisconsin, Michigan, South Dakota, Kansas, Missouri, Kentucky, and Ohio. These 12 states make up the Corn Belt.

Corn is the major feed grain grown by farmers in the U.S., leading all other crops in value and volume of production. Corn is a major component in foods like cereals, peanut butter, and snack foods.

An ear of corn has an average of 16 rows with 800 kernels. A pound of corn consists of approximately 1300 kernels. An acre (about the size of a football field) of corn, yielding 100 bushels, produces approximately 7,280,000 kernels. Most of the weight of a bushel of corn is the starch, oil, protein, and fiber, with some natural moisture.

Farmers grow corn on every continent of the world except Antarctica. Hybrid varieties of corn have been developed to adapt to specific growing conditions and locations worldwide. Hybrids are the offspring produced by breeding plants of different varieties.

One hundred years ago, starch was basically the only product resulting from corn refining and the rest of the kernel was thrown away. Today, there are uses for every part of the kernel – even the water in which it is processed. The corn seed (kernel) is composed of four main parts: the endosperm, the pericarp, the germ, and the tip cap. The endosperm is most of the dry weight of the kernel. It is also the source of energy for the seed. The pericarp is the hard, outer coat that protects the kernel both before and after planting. The germ is the living part of the corn kernel. The germ contains genetic information, vitamins, and minerals that the kernel needs to grow. The tip cap is where the kernel was attached to the cob.

Corn can be made into fuel, abrasives, solvents, charcoal, animal feed, bedding for animals, insulation, adhesives, and more. The kernel is used as oil, bran, starch, glutamates, animal feed, and solvents. The silk is combined with other parts of the corn plant to be used as part of animal feed, silage, and fuels. Husks are made into dolls and used as filling materials. The stalk is used to make paper, wallboard, silage, syrup, and rayon (artificial silk).

Materials Needed:

- "A Brief History of Corn" handout
- "A Golden Nugget" handout
- Corn kernels
- Map of the U.S.
- Table knife for each group
- Container of water to soak corn

Activity Outline:

1. Discuss the background information with the students.
2. Using a map of the United States, have students identify which states are part of the "Corn Belt."
3. Hand out "A Brief History of Corn." Have students take turns reading paragraphs out loud to learn about the history of corn, its uses, and corn development and growth.
4. Soak some kernels overnight. Then give each student several kernels of corn. Pass out table knives and allow the students to dissect the kernels. Allow time to make observations. The handout, "A Golden Nugget," will be helpful during the dissection and discussion.

Discussion Questions:

1. Who used corn in ancient times?
2. What are some of the ways corn is used today?
3. Where is most of the corn grown in the United States?
4. How have the uses of corn changed over time?
5. What are parts of the corn kernel called, and how are these parts useful?

Related Activities:

1. For more information and activities on corn, contact your county Farm Bureau® for free copies of *Ag Mag* 11 entitled "Corn Curl 500."
2. Have students cut pictures from newspapers, magazines, and/or food labels to create a collage depicting the by-products derived from corn. (Examples: corn oil, cereal, candy, etc.)
3. Have the students bring corn products to the classroom. Check ingredients on the label.
4. Make corn dishes, such as a corn casserole, grits, corn muffins, chocolate covered popcorn, etc., and have a corn feast.
5. Students could collect a variety of corn recipes. Have the students sort the recipes into logical categories, illustrate, and combine into a class cookbook.
6. Students can make a corn plant out of construction paper to create a bulletin board.
7. Hold a "Corn Kernel Counting Contest" and have the students try to guess how many kernels are in a jar or bag. This could be done with kernels of popcorn, dried feed corn, or seed corn. Have students prepare posters or slogans during the contest which identify the number of kernels on a single ear of corn, in a one-pound bag, in a single bushel, etc. Challenge students to see how many other relationships they can think of and to express them creatively.
8. Read to the class:
   Corn Belt Harvest by Raymond Bial. A photographic essay of producing corn in the Corn Belt in the 1990s.
   The Story of Corn by Peter Limburg.

To be used with:
Corn – An A-Maizing Plant

Name ____________________________

A Brief History of Corn

Since ancient times, corn has played an integral role in human history. Corn is a grass, native to the Americas. The exact origin of the grain remains unknown, but tiny ears of corn have been discovered at ancient village sites and in tombs of early Native Americans. Evidence of corn in central Mexico suggests it was used there as long as 7000 years ago, where it was domesticated from wild grass. Cultivated corn is known to have existed in the southwestern U.S. for at least 3000 years. To the Aztecs and the Incas, corn was a staple of their diet that provided flour and vegetable dishes for their meals. Here in the United States, many of the various Native American tribes have traditionally grown corn – also known as maize – and used it for both food and utilitarian purposes. Corn was so important to some Pueblo tribes of the Southwest that it was considered one of the three sacred foods (along with beans and squash), so sacred that some groups even worshipped it. Indeed, Native American mythology is rich with stories involving corn and important religious events. Many eastern tribes shared their knowledge of corn production with the early European settlers, an act which saved many pioneers from starvation.

Uses of Corn

Along with wheat and rice, corn is one of the world's major grain crops. It is the largest grain crop grown in the U.S. Corn has been used as a foodstuff for humans (about 9 percent of each crop), as well as for livestock (about 64 percent of each crop). Corn has found its way into a wide variety of American foods. These foods include corn kernels, corn meal, and other food products such as: cooking oils, margarine, and corn syrups and sweeteners (fructose), to name a few. Corn is also an excellent source of carbohydrates.

Corncobs have been used as a soft-grit abrasive and to provide furfural, a liquid required in the manufacturing of nylon fibers. Corn has been used as a source for producing degradable plastics. Additionally, ethanol (a type of renewable fuel made from corn) has shown the possibility of becoming a major "new" fuel for the world's automotive industry. From foods of the past to fuels of the future, this highly diverse crop has played a major role in human civilization.

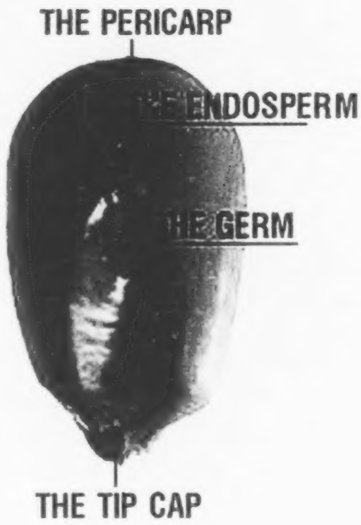
Corn Development and Growth

As miraculous as the many uses for corn may be, the way corn develops and grows is equally fascinating. A single seed (or kernel) of corn may produce a plant which yields more than 600 kernels of corn per ear. To understand the vast amount of seed produced by corn plants, consider the following example: A single kernel can produce a plant that will contain at least 600 kernels per ear. On one acre of land, anywhere from 22,000 to 35,000 individual plants may be grown. If each plant produces at least one ear of corn the yield will be 13,000,000 (thirteen million) kernels of corn from that single acre. (In general, hybrid corn is developed to produce from one to two ears per plant.) A 400-acre farm would then yield over five-billion kernels from its production. In addition, consider that U.S. corn yields have increased 125 percent since 1950.

Adapted from The Nature of Corn, a publication on Environmental Impacts of Corn and Corn Products, by the Illinois Corn Marketing Board. Visit their web site at www.ilcorn.org.

To be used with:
Corn – An A-Maizing Plant Name ______________________________

A Golden Nugget



The Endosperm

The endosperm is about 82 percent of the kernel's dry weight. It is the source of energy and protein (starch) for the germinating seed. There are two types of endosperm, soft and hard. In the hard endosperm, starch is packed tightly together. In the soft endosperm, the starch is loose. When corn dries in the field before harvest, the moisture loss causes the soft endosperm to collapse and form a dent in the top of the kernel.

The Pericarp

The pericarp is the outer covering of the kernel that protects it from deterioration. It resists water and water vapor and is undesirable to insects and microorganisms.

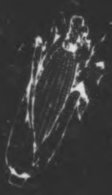
The Tip Cap

The tip cap is the only area of the kernel not covered by the pericarp. It was the attachment point of the kernel to the cob. It is the major entry path into the kernel.

The Germ

The germ is the only living part of the corn kernel. It contains the essential genetic information, enzymes, vitamins, and minerals for the kernel to grow into a corn plant. About 25 percent of the germ is corn oil. Corn oil is the most valuable part of the corn kernel because of the amount of linoleic fatty acid (polyunsaturated fat) and its bland taste.

Corn Components



Starch	61.0%
Feed	19.2%
Oil	3.8%
Water	16.0%

The World of Corn 1999 by the National Corn Growers Association.

Most "Bean"-ificial

Grade Level: 4-6

Approximate Length of Activity: 35-40 minutes

Objectives:

Teacher:

1. Teach students about soybeans and how useful they are for everyone—not just farmers.
2. Help students identify important dates in the history of soybeans.
3. Help students identify products made with soybeans.

Students:

1. Identify important dates in the history of the soybean, and place those dates in chronological order on a timeline.
2. Name products that are made with soybeans.

Illinois Learning Standards: 13.B.2b; 13.B.2c

Introduction:

Soybeans are produced for human food, consumer and industrial products, and livestock feed. Soybeans are one of the nation's most fascinating and versatile edible plants. In 1998, Illinois farmers harvested 10,700,000 acres of soybeans. From those acres, 469,000,000 bushels of soybeans are produced. From foods to ink, paints to plastics, soybeans have hundreds of everyday uses. Some of those products are probably in your kitchen or garage right now!

Even though soybeans have been a major food crop in China for over 5000 years, soybeans were not grown in our country until the 1800s. At first soybeans were small, and their uses few, until a scientist named George Washington Carver began to find more and more uses for them. By 1904, he developed over 300 useful by-products of soybeans.

Soybeans touch our lives hundreds of times a day: when we eat, read a newspaper, get into our cars, and even when we open our front doors. Soybeans are often called magic beans because they produce so many products. Some of the products made from soybeans include: cereal, cooking oil, chocolate, hot dogs, candy, baby food, flour, soup, ice cream, vitamins, cookies, printing inks, soap, shampoo, fabric softener, paints, diesel fuel, plastics, cosmetics, and pet food.

Some other uses for soybeans that scientists have discovered are: biodiesel fuel, soybean crayons, soy ink, and building materials.

Biodiesel Fuel – Biodiesel fuel, which can be used in any diesel engine, is made from soybean oil. This fuel is a clean-burning and biodegradable fuel that can help cities meet federal clean air standards. Unlike petroleum diesel, biodiesel fuel emits a much lower amount of pollutants, is sulfur-free, and does not produce explosive vapors. Biodiesel fuel also provides similar horsepower, torque, and miles per gallon as petroleum diesel.

Soybean Crayons – Soybean crayons are made with soybean oil instead of petroleum-based paraffin wax. Soybean crayons provide brighter and smoother colors that don't flake. These crayons can be found under the Prang Fun Pro™ Crayons name at many discount and office supply stores.

Soy Ink – Soy ink is also made with soybean oil. Newspapers, commercial printers, and government agencies use soy ink instead of petroleum-based ink, because it prints more paper per pound and offers better color reproduction. In fact, over 90 percent of all U.S. daily newspapers are printed using soy ink.

Building Materials – Biocomposite building material is made with soy flour and recycled paper. A fourth grade student from Minnesota contributed to inventing this new building material. Scientists continued research and development until they produced a board similar to wood, harder than oak, and lighter than granite. Biocomposite building material can be used in countertops, furniture, plaques, and much more.

Materials Needed:

- "Miracle Bean Boxes" worksheet
- "A Long Line of Soybeans" worksheet

Activity Outline:

1. Discuss the importance of timelines and why they are a useful tool.
2. Ask students if they know of any products made with soybeans. Lead them in a discussion about soybean uses and some new products made with soybeans.
3. Have students complete the worksheet "Miracle Bean Boxes" to become familiar with products made with soybeans.
4. Have the students complete the worksheet "A Long Line of Soybeans."

Discussion Questions:

1. How did soybeans become such an important commodity for Illinois farmers?
2. Name some soybean products.
3. Name some important events in the history of the soybean.

Related Activities:

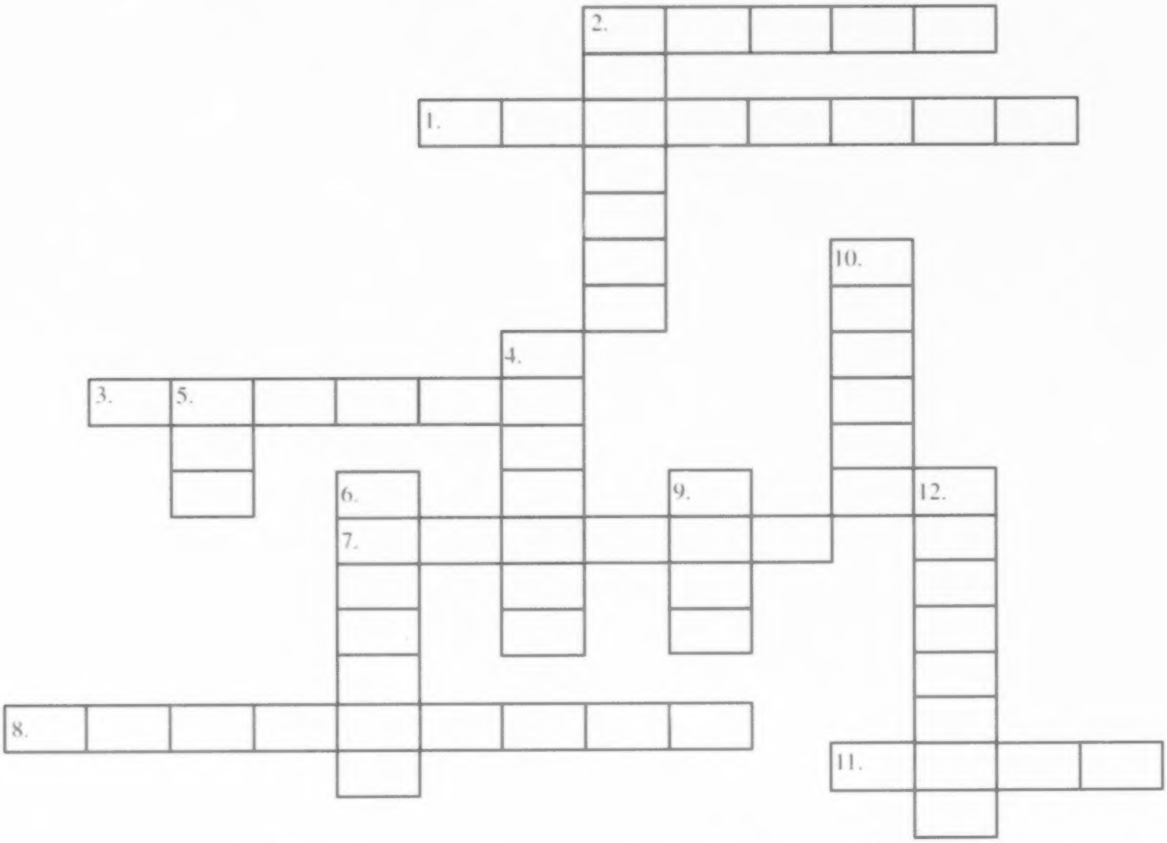
1. Contact your county Farm Bureau® to receive free copies of Illinois Farm Bureau's® *Ag Mag* 10 on soybeans. *Ag Mag* 10, entitled "Imagine a Bean . . . It's the Coolest Thing," has more information on soybeans and activities for your classroom.
2. Contact your county Farm Bureau® to help find a soybean farmer to serve as a guest speaker for your classroom.
3. Contact the Illinois Soybean Association, 1605 Commerce Parkway, Bloomington, IL 61704, (309) 663-7692. Representatives can provide additional classroom materials for incorporating soybean lessons and activities into your curriculum.
4. Write a three-paragraph essay about the importance of soybeans to the U.S.

To be used with:
Most "Bean"-ificial

Name ______________________________

Miracle Bean Boxes

Read the clues below to figure out which soybean products go in the crossword puzzle.



Down

2. You feed your dog or cat with this type of food.
4. This product is used in your bicycle helmet to protect your head.
5. Soybeans are used in this industrial product to print newspapers.
6. This product makes our hair clean and shiny.
9. We use this to wash our hands, wash our clothes, and to wash our dishes.
10. Eat this for breakfast to start your day off right.
12. This food is for very young people. It contains soybeans to provide protein.

Across

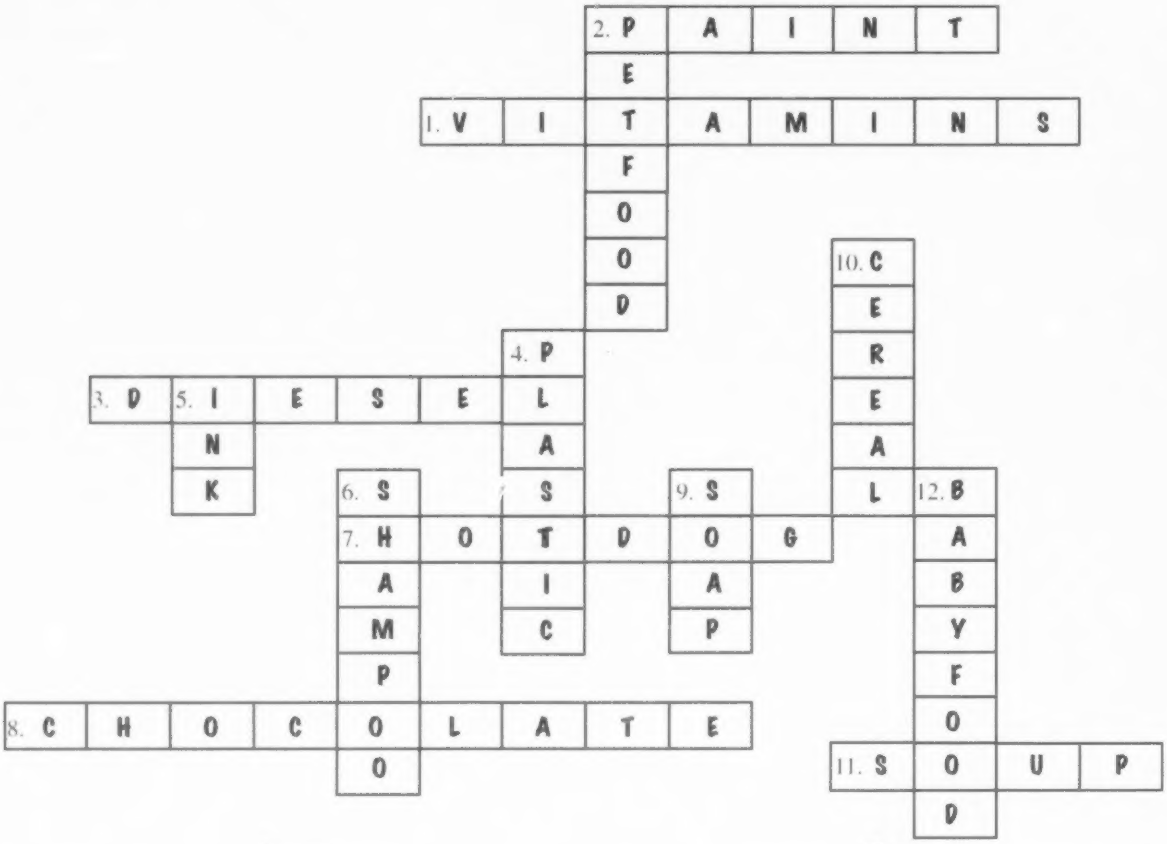
1. Take these every day to make sure you get your daily nutrients.
2. A coat of this product will freshen up a room.
3. This fuel is environmentally friendly.
7. Lots of people eat this food at a ballgame.
8. This is used to make many sweets and treats that we love to eat!
11. When you're sick this will make you feel better.

To be used with:
Most "Bean"-ificial

Answer Key

Miracle Bean Boxes

Read the clues below to figure out which soybean products go in the crossword puzzle.


2. PAINT
2. PETFOOD
1. VITAMINS
10. CEREAL
4. PLASTIC
3. DIESEL
5. INK
6. SHAMPOO
9. SOAP
12. BABYFOOD
7. HOTDOG
8. CHOCOLATE
11. SOUP

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To be used with:
Most "Bean"-ificial

Name ______________________________

A Long Line of Soybeans

Directions – Listed below are 15 different dates that are important in the history of soybeans. Put the dates in the proper order by placing a 1 in front of the event that happened first, a 2 in front of the next event, and so on.

_____ 1904 – George Washington Carver discovers that soybeans are a valuable source of protein and oil.

_____ 164 BC – Soybean curd (tofu) is invented.

_____ 1995 – The "New England Journal of Medicine" reports that soybean protein consumption reduces LDL cholesterol (the bad cholesterol) by 12.9% and reduces total cholesterol by 9.3%.

_____ 8000 BC – Animals are domesticated in the Middle East marking the birth of agriculture.

_____ 1922 – The first U.S. soybean processing plant opens in Decatur, Illinois by A.E. Staley.

_____ 1990 – The U.S. grows 51% of the world's soybeans.

_____ 1850 – Civil war soldiers roast soybeans in place of coffee beans when coffee beans become scarce during the war.

_____ 700 BC – Chinese make soy sauce.

_____ 1804 – Soybeans come to America.

_____ 1929 – Soybean pioneer William J. Morse spends two years in China gathering more than 10,000 soybean varieties for U.S. researchers to study.

_____ 2000 BC – Soybeans are first planted in China for food.

_____ 1997 – Prang® starts marketing crayons made from soybeans for back-to-school sales.

_____ 1987 – Soy ink is used to print newspapers.

_____ 1940 – Henry Ford demonstrates the strength of the soybean plastic he has developed by taking an ax to the plastic on one of his cars.

_____ 1860s – U.S. farmers begin to grow soybeans for soy sauce and cattle feed.

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To be used with:
Most "Bean"-ificial

Answer Key

A Long Line of Soybeans

Directions – Listed below are 15 different dates that are important in the history of soybeans. Put the dates in the proper order by placing a 1 in front of the event that happened first, a 2 in front of the next event, and so on.

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Where in the World Do Those Cookies Come From?

Grade Level: 4-6

Approximate Length of Activity: 20-25 minutes

Objectives:

Teacher:

1. Help students reinforce geography skills through continent and country identification.
2. Teach students the definition of "import" and "export" and to identify products we import to the United States.

Students:

1. Identify and label continents on a blank world map.
2. Identify and label specific countries on a blank world map.
3. Come to understand that many products we use are grown in other countries and imported to the United States.
4. Learn that the ingredients of one item, such as a chocolate chip cookie, can come from many different countries.

Illinois Learning Standards: 15.B.2c; 15.D.2a; 15.D.2b; 17.A.2b

Introduction:

To import is to bring products into a country from another country. Our country imports many products including: cocoa, cinnamon, vanilla, olive oil, wool, coffee, various fruits, rubber, sugar, tea, machinery, cars, and clothing. Products grown in the U.S. during a certain season, but not all year, are often imported during the off-season. This primarily includes certain fresh fruits and vegetables. Occasionally, an agricultural product, such as sugar, will be imported to the U.S. in its raw form, then processed and packaged in America. In 1998 the United States imported $37 billion of agricultural products.

To export is to sell products to another country. The U.S. exports, or sells to other countries, wheat, soybeans, soy products, beef, pork, and other feed grains. These are just a few of the products we export. We are able to export these products because they can be grown, raised, or produced in the United States, and we grow more than we need. In 1998, $53.7 billion worth of American agricultural products were exported. The countries we export the most to are: Japan, Canada, South Korea, Mexico, China, Taiwan, and the Netherlands. Importing provides the United States with the goods we need and want that are not produced here. Exporting provides other countries with American goods.

Trade and marketing are very important to American agriculture. U.S. farmers grow much of the food that feeds the world. Sales of U.S. commodities to Japan, the European countries, Canada, and Mexico help to make America the largest exporter of agricultural commodities in the world. Sales of value-added products, such as processed or packaged foods to other countries from the U.S., are increasing each year. Frozen vegetables and boxed cereal, processed and packaged in the U.S., can now be found in supermarkets around the world.

Materials Needed:

- "Where in the World Do Those Cookies Come From?" worksheet
- Colored pencils

Activity Outline:

1. Initiate a discussion about imports and exports. Help the students understand the words "import" and "export." Discuss what types of items the U.S. imports and exports. Explain to the students that they are going to learn about the ingredients in chocolate chip cookies and where they come from.
2. Ask students to list as many ingredients in chocolate chip cookies as they can. (Use the back of a chocolate chips package for a complete list of cookie ingredients.) Tell them some of the ingredients are grown and processed in Illinois such as flour and butter. However, other ingredients are imported from other countries, then processed in the United States.
3. Pass out the worksheet "Where in the World Do Those Cookies Come From?"
    a. Label the following continents on the map: Africa, Asia, Australia, Europe, North America, and South America. (Some students may need a world map to help with identifying countries.)
    b. Use clues to identify countries from which we import the ingredients on the worksheet. Have students draw a line from the clue to the country.

Discussion Questions:

1. What is the difference between import and export?
2. From which country do we import the most products for chocolate chip cookies?
3. Why would the U.S. import a product?
4. Why would the U.S. export a product?

Related Activities:

1. Allow students to eat chocolate chip cookies while completing the activity.
2. Follow the recipe on the back of the chocolate chips package and make cookies. Ask students to volunteer to bring in the ingredients.
3. Take a survey of your students' favorite cookies. Have students create bar graphs displaying that survey information.

4. A cup of food a day may be all someone has to eat in a starving country. To really get the picture, put one cup of rice or another grain in a plastic sandwich bag. Hold the bag, feel the grain, and imagine it is all you have to eat for an entire day.
5. Ask students to list five foods they ate yesterday. Where might each of these been grown? Which foods would you miss the most if no foods were imported?

Lesson adapted from Minnesota Agriculture in the Classroom Ag Mag Volume 10, Issue 2.

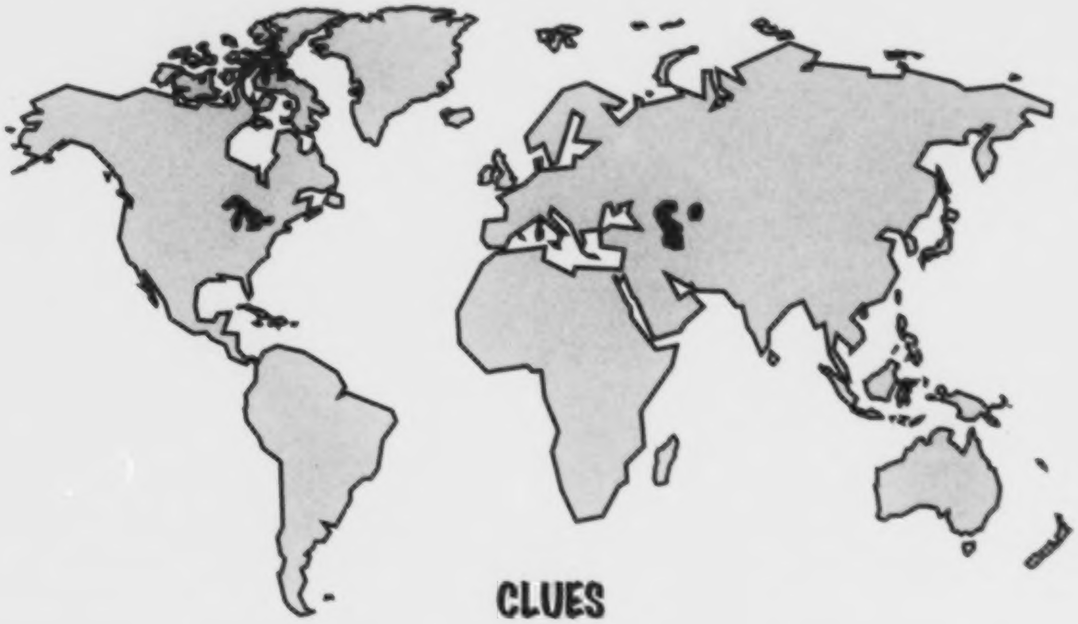
To be used with:
Where in the World Do Those Cookies Come From? Name ______________________________

Where in the World Do Those Cookies Come From?

When you're hungry for chocolate chip cookies, it's a lucky thing that we can buy and sell food all over the world. That's the only way to get everything you need for the recipe! Hard to believe? Some of the ingredients are only grown in other countries. Here's the scoop on where those ingredients may have come from.

1. Read the clues below. Use a world map to locate and label each country named in the clues.

2. Draw a line from the buttons by each ingredient to the country it came from. You'll see how agriculture and world trade help make your cookies!



CLUES

●	●	●	●	●	●	●
Cacao for chocolate chips from Ivory Coast	**Vanilla** from Mexico	**Nuts** from Greece	**Butter** from the United States	**Cinnamon** from India	**Eggs** from the United States	**Flour** from the United States

Adapted from Minnesota Agriculture in the Classroom Ag Mag Volume 10, Issue 2.

To be used with:
Where in the World Do Those Cookies Come From? **Answer Key**

Where in the World Do Those Cookies Come From?

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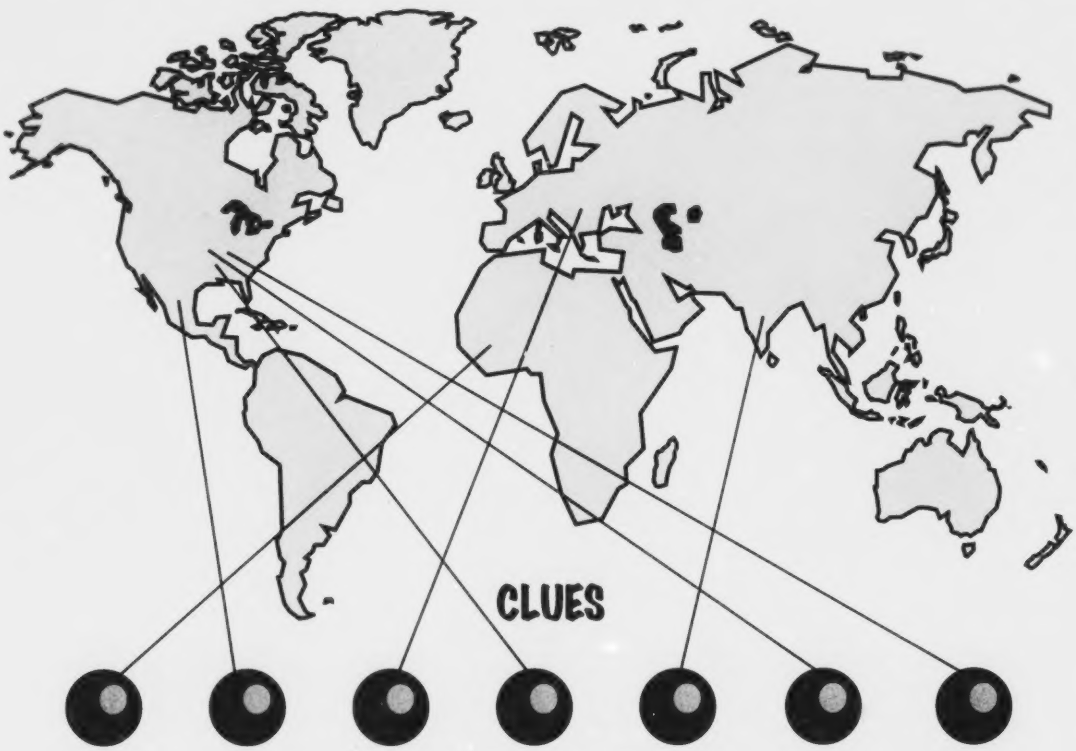

Cacao for chocolate chips from Ivory Coast

Vanilla from Mexico

Nuts from Greece

Butter from the United States

Cinnamon from India

Eggs from the United States

Flour from the United States

Adapted from Minnesota Agriculture in the Classroom Ag Mag Volume 10, Issue 2.

Usable Water

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

1. Demonstrate the locations of water on earth.
2. Emphasize to students the need for water conservation.

Students:

1. Learn the locations of water on earth.
2. Understand the need for water conservation.
3. Discover ways he/she may begin conserving water immediately.
4. Recognize ground water as the most available source of fresh water.

Illinois Learning Standards: 12.E.2a; 13.B.2f; 17.B.2a; 17.C.2a; 17.C.2b; 17.C.2c

Introduction:

Water covers more than 70 percent of the earth's surface. Water is in the oceans, rivers, lakes, ground, and air we breathe. Water helps regulate the earth's climate. The land quickly absorbs and releases heat from the sun, but the oceans absorb and release the heat slowly. This causes the ocean breezes to cool the land in the summer and warm it in the winter.

The continuous movement of water in and around the earth is called the hydrologic cycle or water cycle. When rain or snow falls on oceans and land as precipitation, the soil will soak up some of the water. Plants will take up some of this water through their roots. Some water will move down the soil and become ground water. Some of the water will also run across the land into streams, marshes, lakes, and oceans. The water that remains on top of the earth is called surface water. Surface water will return to the atmosphere through evaporation. Water vapor in the air may form clouds that cause precipitation (rain or snow) to occur again. The precipitation then returns to the earth's surface. This is the hydrologic cycle.

Life is not possible without water. Water is in every living thing. Our body is nearly 65 percent water. An ear of corn is nearly 70 percent water, a potato about 80 percent, and a tomato about 95 percent. In order for living things to carry out life processes, we must keep our water supply clean and healthy. We can live without food for about two months, but we cannot live without water for more than a week.

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Many people believe there is not enough water to meet all of the needs of the people throughout the world. Yet, the world will always have the same amount of water because of the water cycle. However, the world's water is unevenly distributed. Some places that have plenty of water go through a drought at times and other places go through a constant drought. We must manage our water quality and supply carefully so it remains safe to use.

Many conservation problems are due to mismanagement of our water supply. Over many years, people have dumped untreated sewage and other wastes into lakes and rivers. This contaminates the water. More and more people now realize we have to take special care of our water to ensure its quality, not only for now, but for the future.

Although 70 percent of the earth is water, nearly 97 percent is in the oceans. Ocean water is too salty for drinking, manufacturing, and farming. The fresh water available for us to use is about three percent of the earth's water supply. Three-fourths of the three percent fresh water is unavailable because it is in icecaps and other glaciers.

Materials Needed:

- 1 gallon container
- 1/2 cup measuring cup
- Clear bowl
- Eye dropper
- Small plate

Activity Outline:

1. This chart shows the distribution of Earth's water supply. Share this information with your students.

EARTH'S WATER SUPPLY

Oceans	97.3%
Ice	2.19%
Groundwater	0.5%
Soil Moisture	0.005%
Atmosphere	0.001%
Inland Lakes	0.018%
Rivers	0.000096%

2. To demonstrate how much of the earth's water supply is actually used, ask some students to help you with the following activity. (Make sure students understand this is just a demonstration and there is actually more water than this on earth.)
   a. Pour water into a *one-gallon* container, such as a plastic ice cream bucket. This represents all the water on the earth.
   b. Pour a half-cup of water out of the one-gallon container and into a clear bowl. The water in the bowl represents all of the fresh water on earth, which is less than three percent of the total water on earth. Fresh water is found in lakes, rivers, groundwater, ice, and living things. The 15 1/2 cups that are still in the one-gallon container represent salt water. We cannot use salt water.

c. With an eyedropper, drop *one drop* of water from the half-cup onto a small plate. This one drop represents the freshwater that is available for our use. This water is found in rivers and lakes. The rest of the water in the half-cup is deep groundwater, bound up as soil moisture, biomass water, or water in the atmosphere.

Discussion Questions:

1. Describe the water cycle.
2. Where is the least/most water?
3. Which source is the least/most usable by living things?
4. Which source is most readily available?
5. How can you and your family conserve water at home?
6. What can farmers do to conserve water for plant and animal use?
7. Why is water important?

Related Activities:

1. Have students make a visual display showing the distribution of water on earth.
2. Introduce the water cycle. Ask students to place the location of water on a diagram they make of the water cycle.
3. Assign individuals or groups of students the task of making a poster to encourage others to practice water conservation. Display these posters in the hallways or in the community (grocery store, bank, library, etc.) so many will see them.

Trees Around The World

Grade Level: 4-6

Approximate Length of Activity: One to two class periods

Objectives:

Teacher:

1. Help students identify different types of trees by description.
2. Allow students time to work cooperatively as they research trees.
3. Help students learn how trees affect the culture, economy, and environmental quality of countries.

Students:

1. Work cooperatively to complete a given task.
2. Identify various types of trees and their locations.
3. Understand the effect trees have on the culture, economy, and environmental quality of countries.
4. Understand the importance of trees.
5. Learn how individuals can help protect trees.

Illinois Learning Standards: 15.A.2a; 17.A.2a; 17.A.2b; 17.B.2b; 17.C.2b; 17.C.2c

Introduction:

A tree is the largest of all plants and the oldest known living thing. Trees have provided us with food, fiber, and medicine for thousands of years. Most importantly, they provide us with wood. Each year millions of trees are cut down from the world's forests. The lumber is used in the building industry and for manufacturing products. Wood pulp is used to make paper, plastics, and other products. Trees also provide fruit, nuts, chocolate, coffee, maple syrup, cinnamon, and cloves.

There are about 20,000 kinds of trees in the world. These trees are grouped together in six main categories according to common features. They are broadleaf trees, needleleaf trees, palm trees, cycad trees, tree ferns, and ginkgo trees. More than 1000 kinds of trees grow in the United States. Most of them are broadleaf trees and needleleaf trees.

There are three main parts of the tree: the trunk and branches, leaves, and roots. The trunk and branches are covered with bark. Bark is hard, dead tissue which protects the living, inner parts of the tree. Bark stretches to let the trunk and branches grow thicker; however, some of the bark will crack and dry and become rough because bark does not stretch easily. The leaves make food for a tree. Chloroplasts in the leaves use energy from sunlight to combine water, minerals, and carbon dioxide to make sugar. This process is called photosynthesis. The leaves also produce oxygen when photosynthesis occurs, and the leaves release this oxygen into the atmosphere. Roots absorb nutrients, such as water, for the tree. The water and minerals that roots absorb are used during photosynthesis to help make food for a tree.

Trees help our environment in many ways. Trees act as windbreaks to keep the wind from blowing the topsoil away. Tree roots help prevent soil from being washed away during heavy rains, because roots hold the soil in place. Trees also help to make soil. The leaves add organic matter to the soil, and roots break soil and rocks down into smaller pieces. Forests provide a sheltered environment for wildlife. Forests in mountain regions prevent snow from sliding and causing avalanches. Trees also add water to the air. Most of the water trees absorb is lost through transpiration, which puts water back into the air.

In this activity, your students will explore the world of trees. They will discover all trees are not the same. After being given clues about some unusual trees, your students will research the clues to find tree names, where they grow, and special features of each. Students will find that trees are critically important to the culture, economy, and environmental quality of most countries on this earth.

Materials Needed:

- "Tree Clues" sheet
- "Trees Around The World" worksheet
- "Tree Pictures"
- Reference books (such as encyclopedias)
- Large map of the world
- Tape and scissors

Activity Outline:

1. Give each student a copy of the "Tree Clues" and "Trees Around The World" worksheets. Split the class into thirteen groups. (If the class is too small for thirteen groups, try dividing into six.)
2. Explain to the groups that they need to use the clues to figure out which clue belongs to which tree. When they match a clue and tree, they should write the clue number on the line next to the tree on the "Trees Around The World" worksheet. The students also need to find one country where each tree is grown. They should also write one of the countries next to the tree on the appropriate line.
3. While the groups are working on the "Trees Around The World" worksheets, cut apart each tree on the "Tree Pictures" sheets.
4. After each group has finished the "Trees Around The World" worksheets, hand out one tree picture to each group. (If you have less than 13 groups, try to distribute the same amount of tree pictures to each group.)

5. Now read a set of clues (any clue). The group that has the matching "Tree Picture" should raise their hands and tell the class what tree matches the clues. The group then needs to place the "Tree Picture" on a country on the world map where the tree grows.

Discussion Questions:

1. How do trees make food for themselves?
2. List some ways trees are different from one another.
3. How do climate and location affect the types of trees that grow there? Give examples.
4. What types of trees grow where you live?
5. How are trees important to the culture, economy, and environmental quality of countries? Give specific examples.
6. What is tropical deforestation? How does it affect other countries?

Related Activities:

1. Have students research trees located in Illinois, make clues, and draw a picture of each tree.
2. Have students brainstorm a list of why trees are important. How are they used? What do they provide to both people and other living things?
3. How can students help protect trees? A tree expert could come to the classroom and talk to the class, or students may ask family and friends as an assignment and share what they've learned the next day.
4. Invite a speaker to class who works with lumber or reforestation. Before the speaker comes, have students list questions they hope to have answered. Students will then be prepared to ask their questions when the speaker has finished.
5. Visit the Illinois Department of Natural Resources web site at http://dnr.state.il.us/

To be used with:
Trees Around the World Name ____________________

Tree Clues

Match the following clues to the trees on the "Trees Around The World" worksheet. Place the clue number next to the appropriate tree.

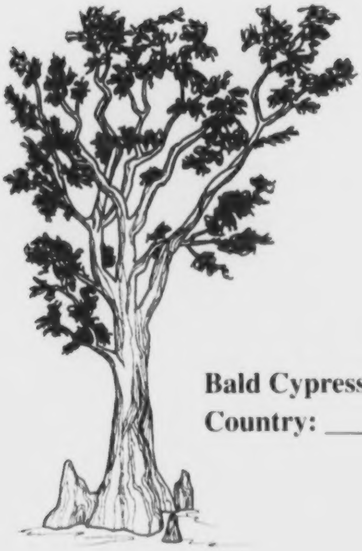
1. This tree grows in the U.S. in a state where one of the largest and rarest birds in North America (a type of vulture) lives. This tree is also one of the oldest living things in the world.
2. The world's largest desert is located on the continent where this tree grows. Its trunk can have a circumference of 40 feet (12 meters).
3. This tree lives in swampy habitats and has "knees" that stick out of the water. The mouth of the Mississippi River is located in one of the states where this tree grows.
4. Roots of this tree grow down from its branches. Bombay is a major city in the country where this tree grows.
5. This tree can store hundreds of gallons of water to help it survive in times of drought. It also grows in parts of Mexico, California, and other areas of the U.S. This tree grows in a state that contains one of the deepest natural wonders of the world.
6. Twisted branches and spiny leaves might make this tree a challenge to climb even for monkeys. This tree is a native of the southernmost South American country.
7. This tree was abundant when the dinosaurs were alive. It is also native of the country where gunpowder, silk, and paper were first made.
8. This tree is one of the tallest trees in the world. Wombats and koala bears are native to the continent where this tree grows.
9. Some bulletin boards, bottle "stoppers," and the centers of baseballs, are made from a part of this tree. One of the main countries this tree grows in is the same country where Christopher Columbus set sail from in 1492.
10. This tree can be found growing in water. It looks like it is growing on stilts to stay above high tide.
11. This tree is planted in rows on large tree farms. It produces the paper these clues are written on.
12. This is a large tree known throughout history for its strength. It starts out life from a small acorn.
13. This tree grows in areas where they have mild winters.
14. A product of this tree is usually found on the breakfast table.

Adapted from Florida Ag in the Classroom Trees Around the World Curriculum for Middle School Social Science.

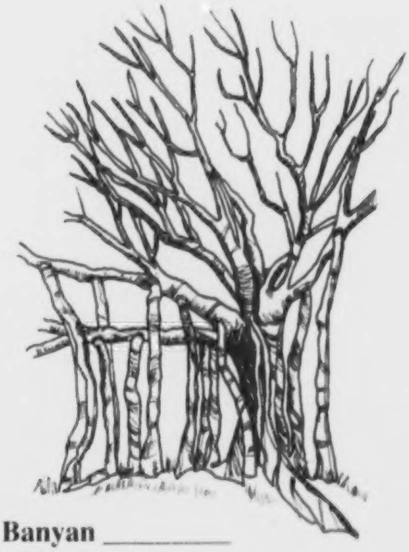
To be used with:
Trees Around The World

Name ______________________________

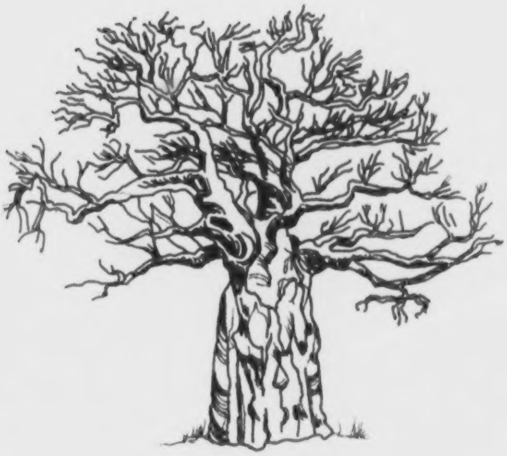
Trees Around The World



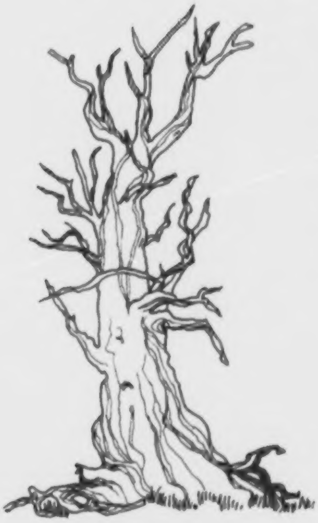
Bald Cypress _________
Country: ________________



Banyan _________
Country: ________________



Baobab _________
Country: ________________



Bristlecone Pine _________
Country: ________________

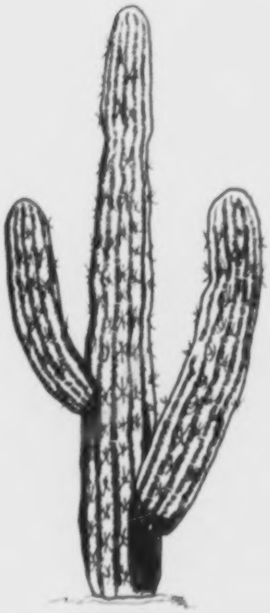
Adapted from Florida Ag in the Classroom Trees Around the World Curriculum for Middle School Social Science.

WS- 204

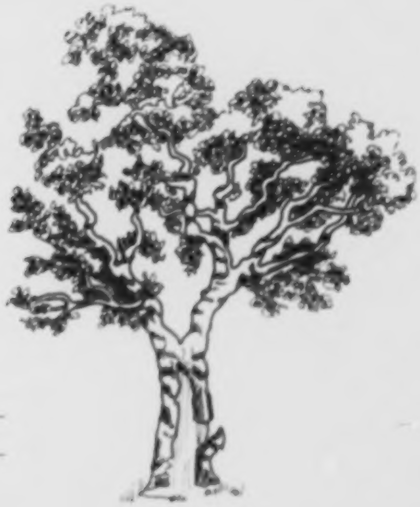
To be used with:
Trees Around The World

Name ______________________________

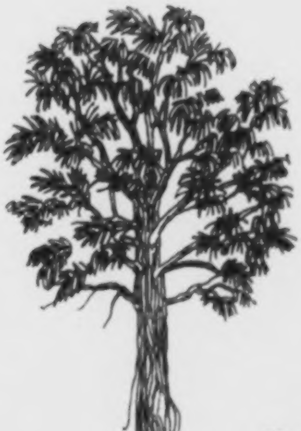
Trees Around The World



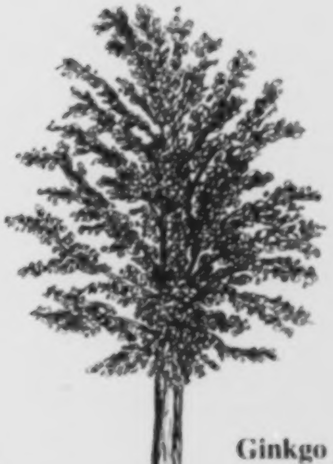
Saguaro Cactus ________
Country: ______________



Cork Oak _________
Country: ________________



Eucalyptus _________
Country: ________________



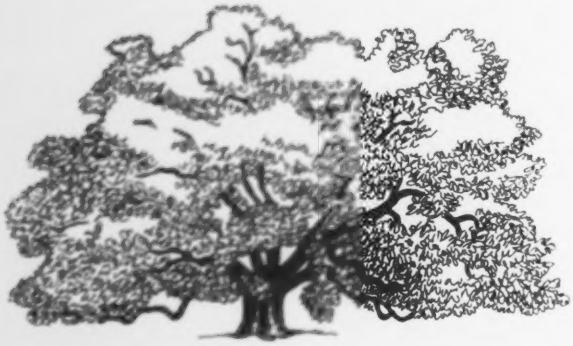
Ginkgo _________
Country: ________________

Adapted from Florida Ag in the Classroom Trees Around the World Curriculum for Middle School Social Science.

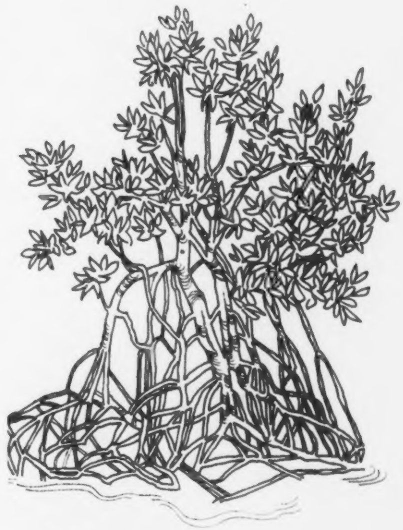
To be used with:
Trees Around The World

Name ________________________________

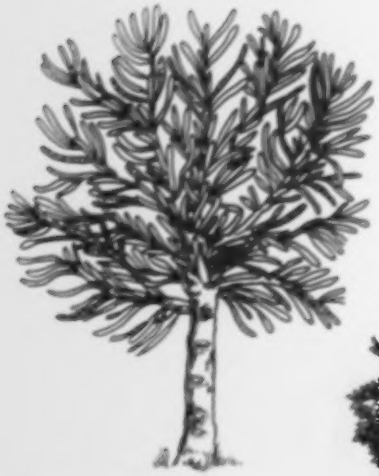
Trees Around The World



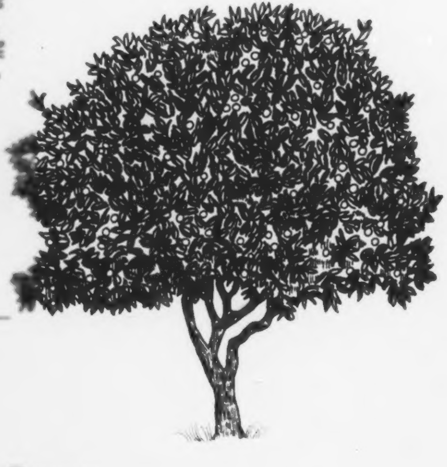
Live Oak ________
Country: ________________



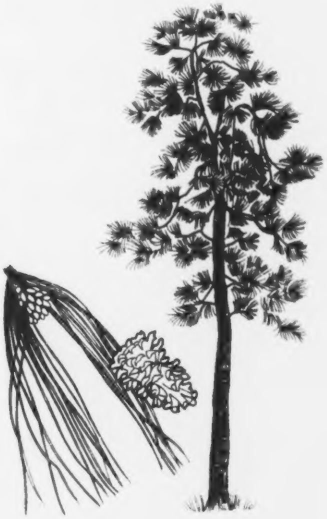
Mangrove ________
Country: ________________



Monkey Puzzle ________
Country: ________________



Orange ________
Country: ________________

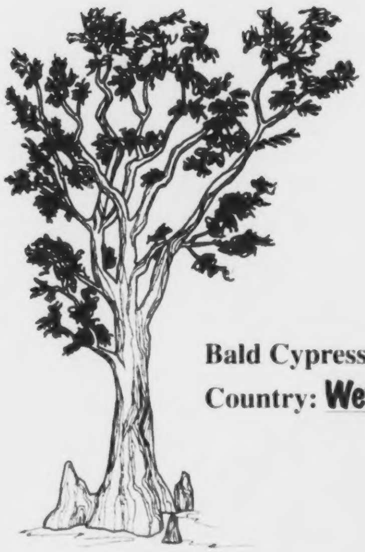


Pine ________
Country: ________________

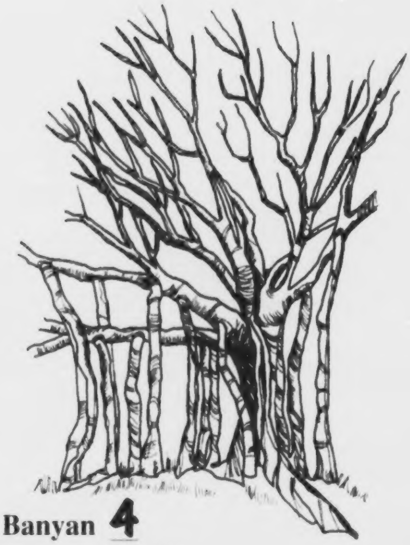
Adapted from Florida Ag in the Classroom Trees Around the World Curriculum for Middle School Social Science.

To be used with:
Trees Around The World **Answer Key**

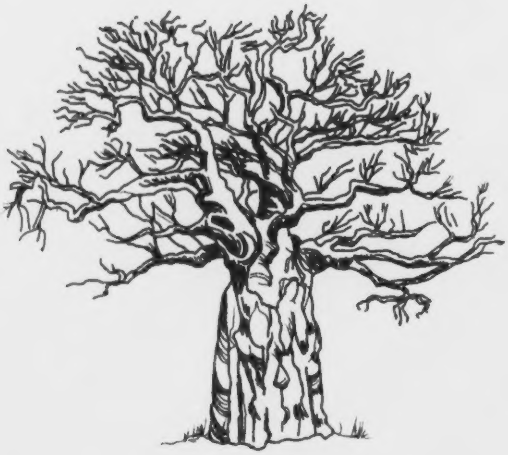
Trees Around The World



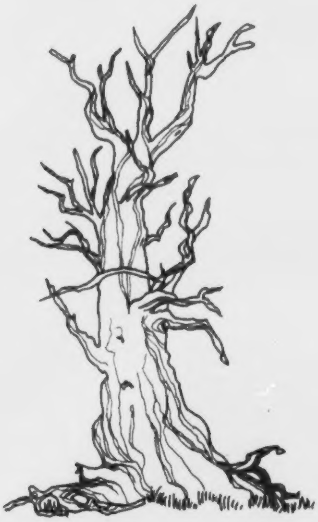
Bald Cypress **3**
Country: **Wet areas/swamplands of the U.S.**



Banyan **4**
Country: **India**



Baobab **2**
Country: **Africa, Australia**

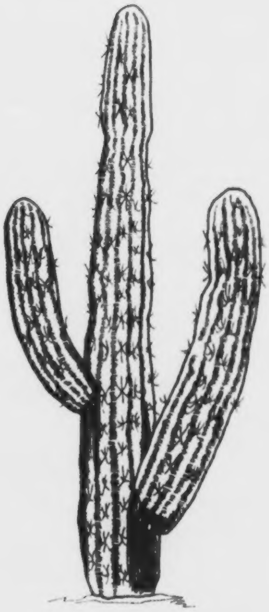


Bristlecone Pine **1**
Country: **Rocky Mountains of the U.S.**

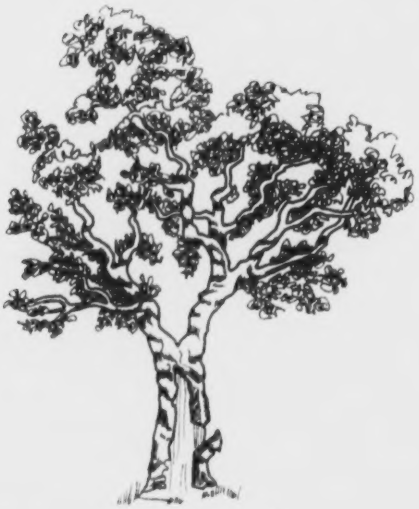
Adapted from Florida Ag in the Classroom Trees Around the World Curriculum for Middle School Social Science.

To be used with:
Trees Around The World **Answer Key**

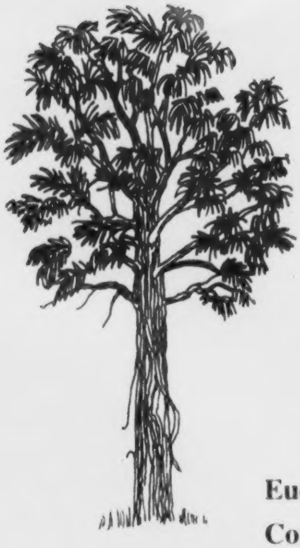
Trees Around The World



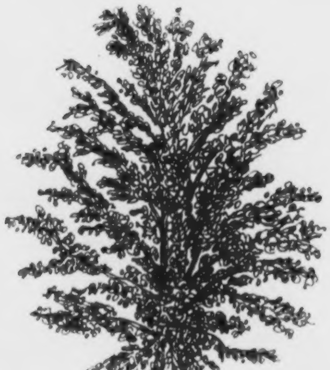
Saguaro Cactus **5**
Country: **Mexico**



Cork Oak **9**
Country: **Africa**



Eucalyptus **8**
Country: **Australia**



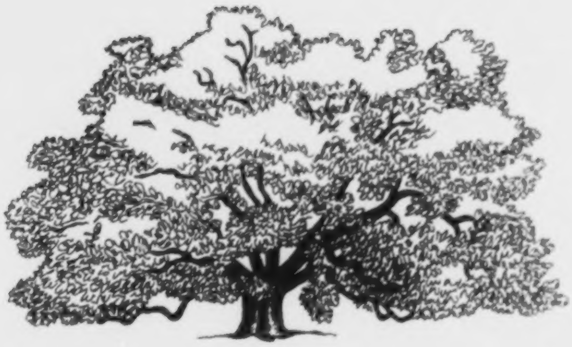
Ginkgo **7**
Country: **China**

Adapted from Florida Ag in the Classroom Trees Around the World Curriculum for Middle School Social Science.
WS- 208

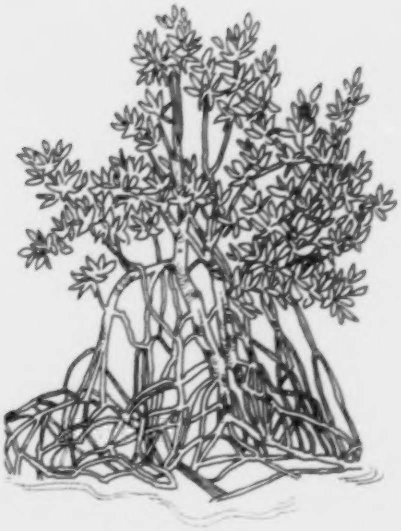
To be used with:
Trees Around The World

Answer Key

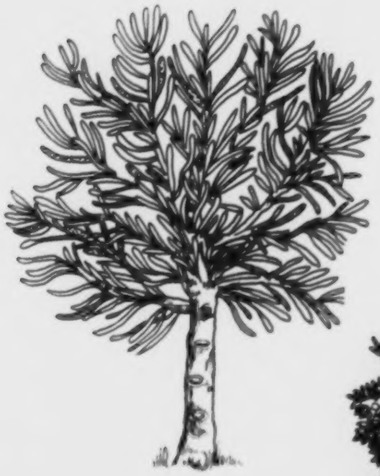
Trees Around The World



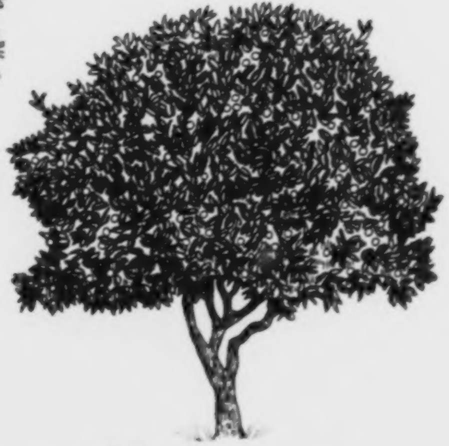
Live Oak 12
Country: Texas, California



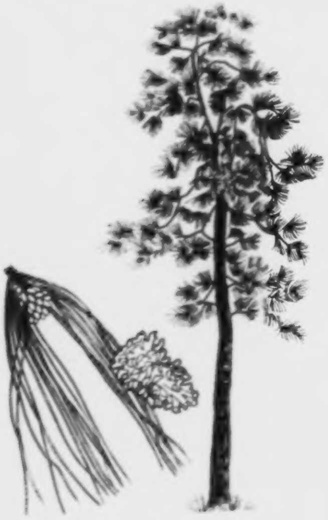
Mangrove 10
Country: Africa, Mexico



Monkey Puzzle 6
Country: Chile



Orange 13
Country: Brazil, Florida, California



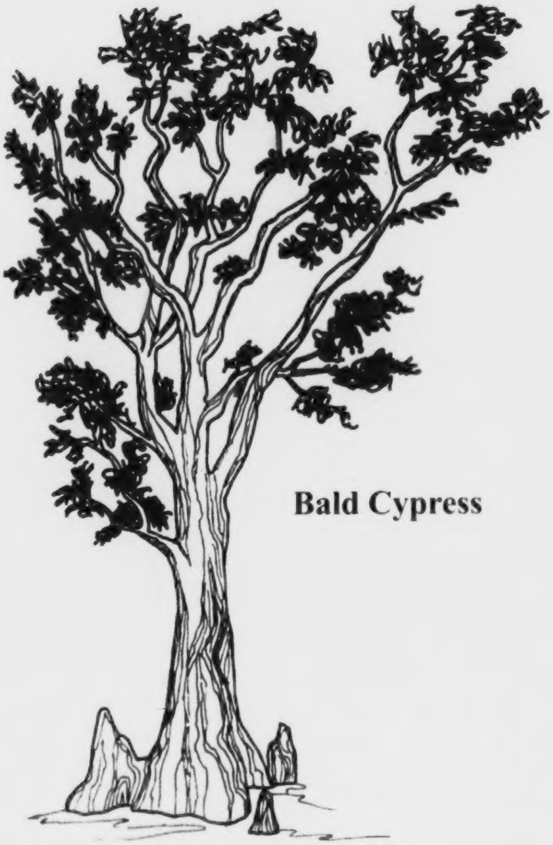
Pine 11
Country: Alaska

Adapted from Florida Ag in the Classroom Trees Around the World Curriculum for Middle School Social Science.

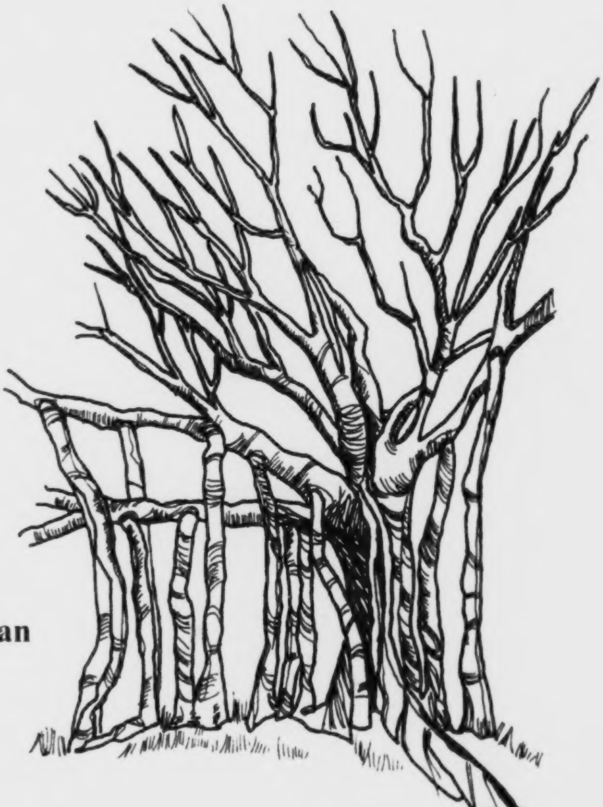
To be used with:
Trees Around The World

Trees To Place on Map

Tree Pictures



Bald Cypress

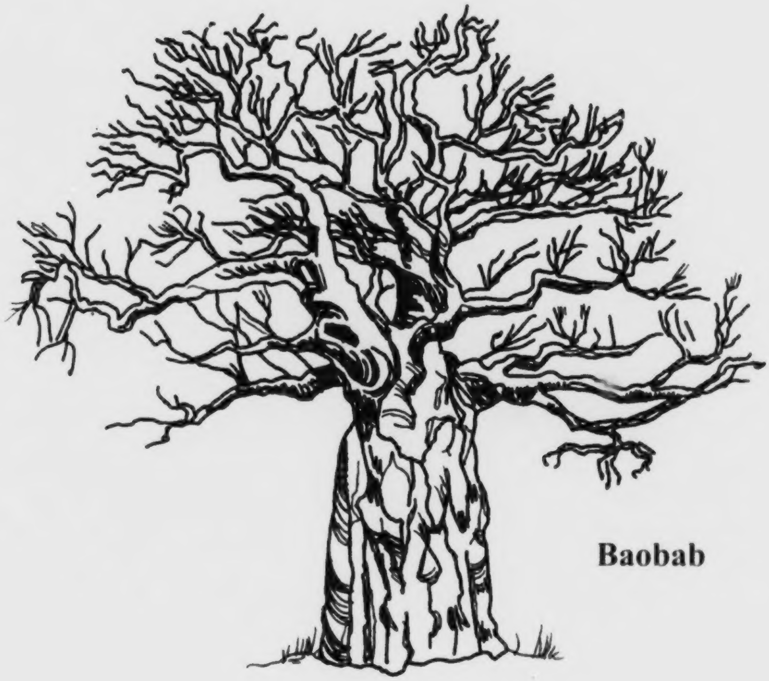


Banyan

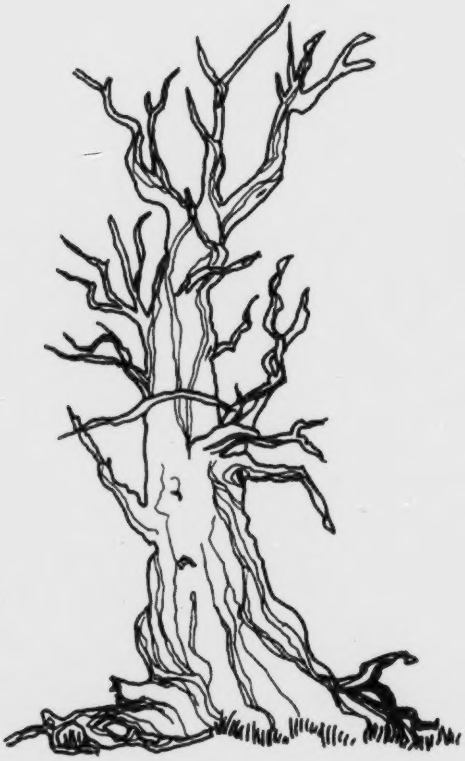
To be used with:
Trees Around The World

Trees To Place on Map

Tree Pictures



Baobab

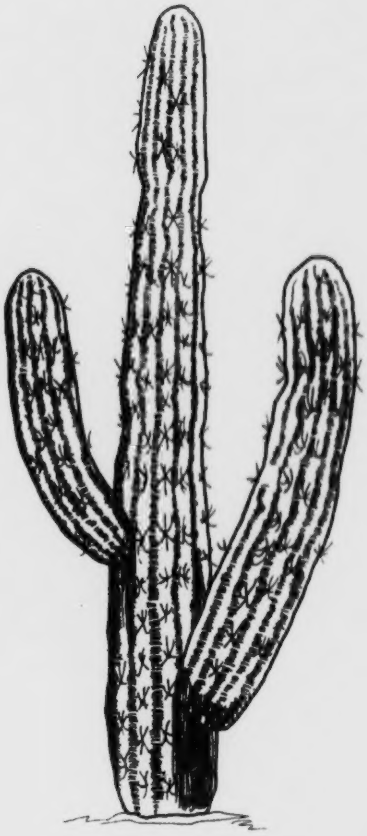


Bristlecone

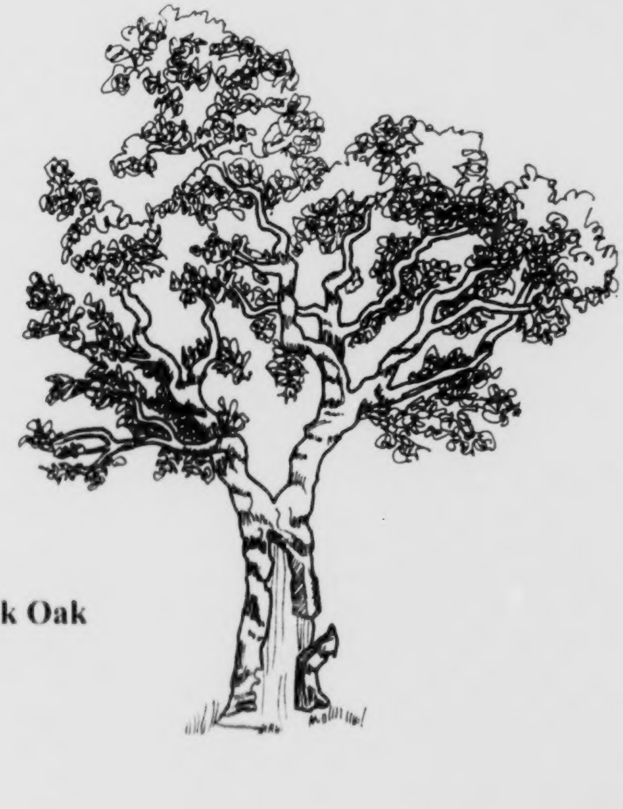
To be used with:
Trees Around The World

Trees To Place on Map

Tree Pictures

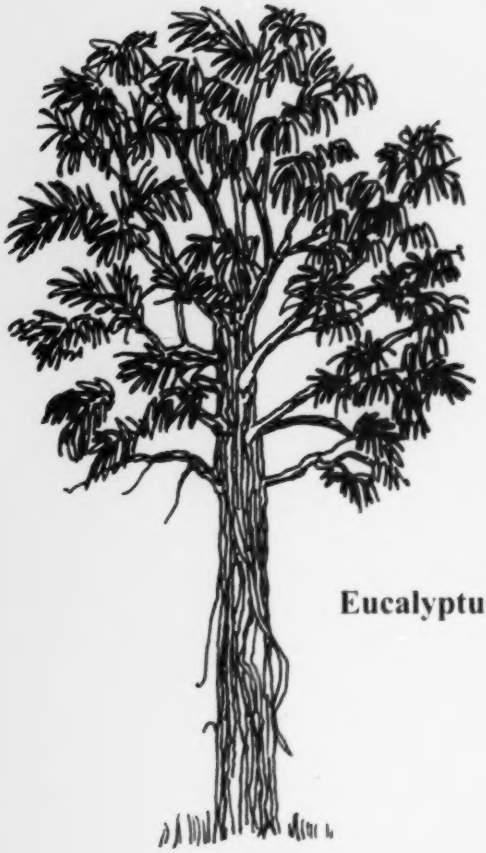


Saguaro Cactus

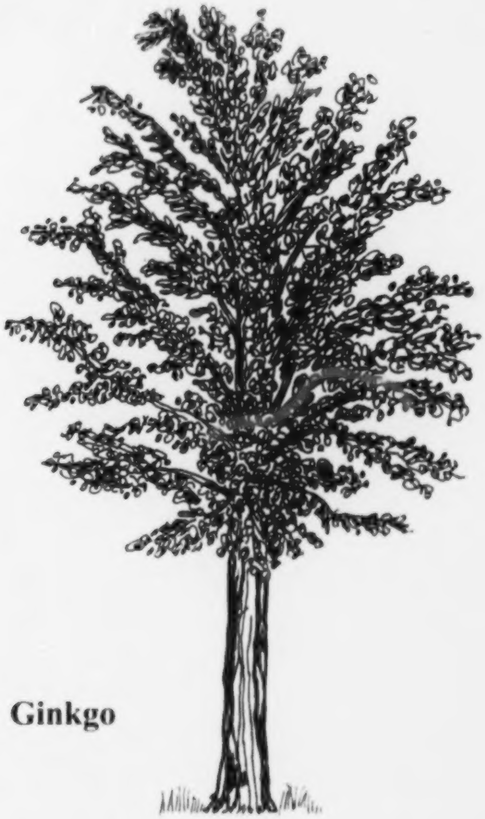


Cork Oak

Tree Pictures



Eucalyptus

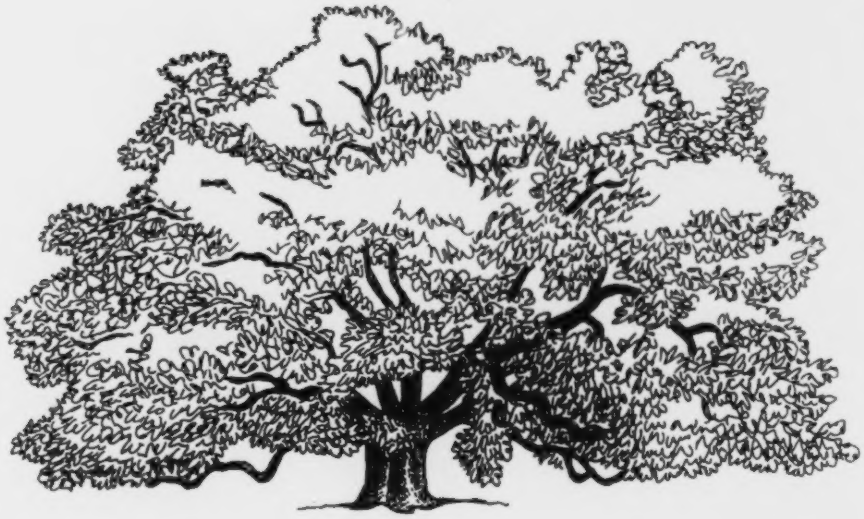


Ginkgo

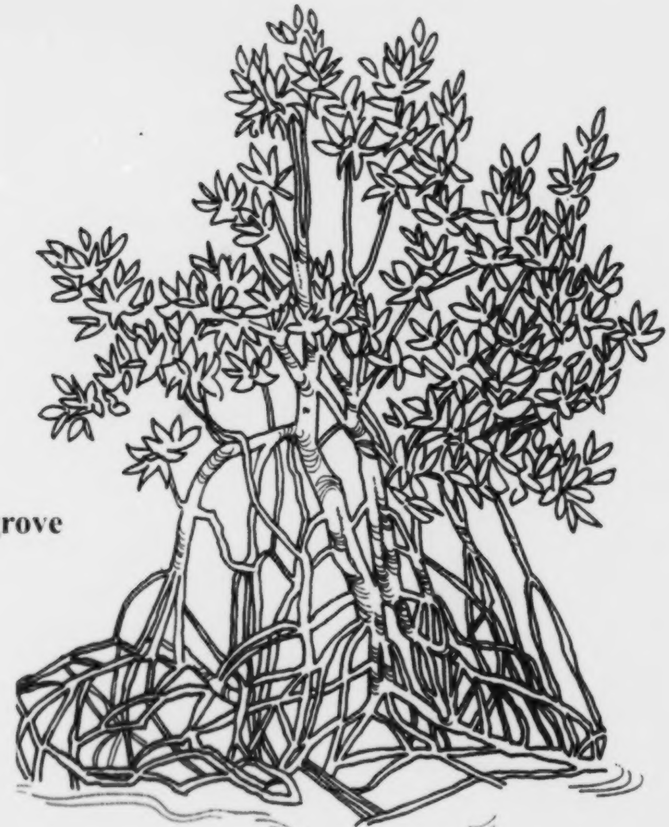
To be used with:
Trees Around The World

Trees To Place on Map

Tree Pictures



Live Oak

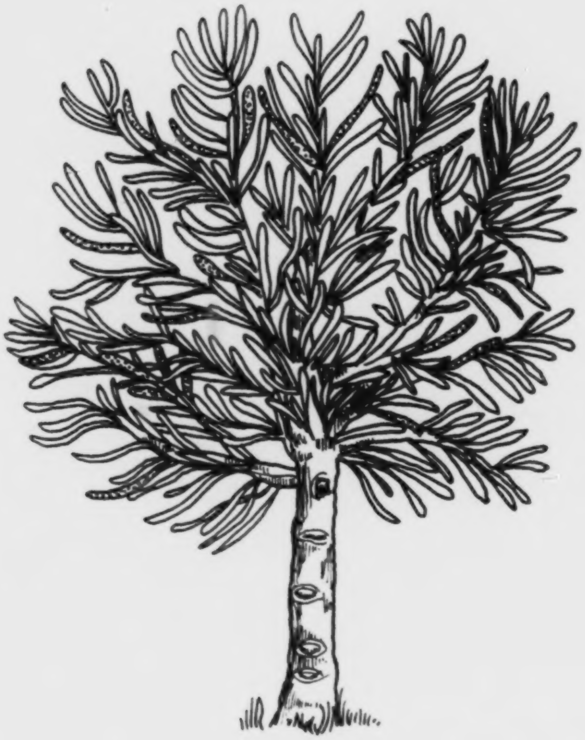


Mangrove

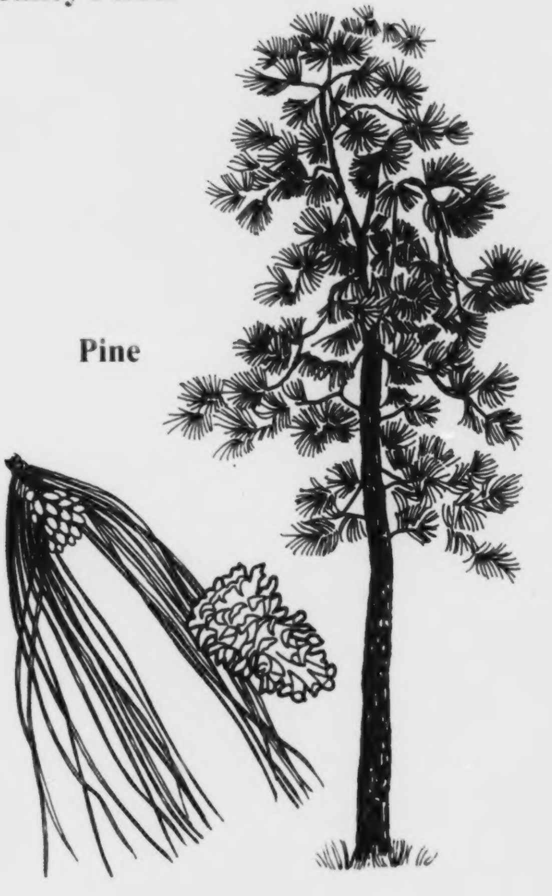
To be used with:
Trees Around The World

Trees To Place on Map

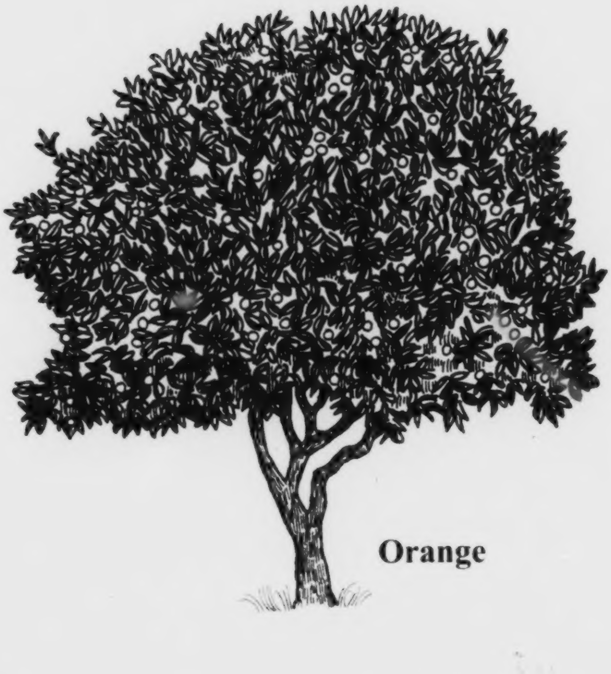
Tree Pictures



Monkey Puzzle



Pine



Orange

Tracking Technology

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

1. Teach the history of agricultural advancements in farming.
2. Familiarize students with various pieces of farm equipment.
3. Understand the purpose and importance of each piece of farm equipment and machinery.

Students:

1. Learn about the changes in farming methods over the years.
2. Learn about the equipment farmers use.
3. Understand what each piece of equipment or machine does.
4. Compare the old way of doing various jobs on a farm with how they are done today.

Illinois Learning Standards: 3.A.2; 13.B.2a; 13.B.2b; 13.B.2c; 13.B.2e; 17.C.2c

Introduction:

Before the voyages to discover new land began, only a few crops were grown in particular regions. For instance, people in Europe did not know what potatoes were until the Spanish brought them to Europe in the 1500s. When European and Spanish explorers and settlers came to America, the native Indians introduced them to many new crops. The Europeans brought with them knowledge of various farming methods, tools, seeds, and livestock.

The Agricultural Revolution began in the early 1700s. During this time, many discoveries and inventions were made. This helped make farming easier and much more productive. Inventions allowed one farmer to produce more food and feed more people than before. As a result, people began taking new jobs off the farm.

Farmers do a lot to prepare the soil for planting and to care for the crop and harvest. In earlier times, farmers had to do most of the jobs by hand with very few tools to help them. Farmers used animals to do most of the heavy work. Farmers have gone from using very few hand tools before the 1700s to using different types of equipment in the 1700s and 1800s. Still, many inventions in the 1800s required animals, such as oxen or horses, to pull them through a field or to supply the power for a machine to run. Since then, many advances in farm machinery and farm equipment have been made. Using modern machinery, one farmer can feed more people now than ever before.

One piece of valuable machinery that farmers use today is a tractor. Before tractors, farmers used horses and other animals to pull and work pieces of heavy equipment. The first types of tractors were called traction engines. They ran on steam and were hard to maneuver. Over time, newer, improved versions were made, and by the 1920s a more practical tractor was developed. Today, tractors are used for many different things. They are used to plant, cultivate, and pull heavy loads, such as wagons filled with grain, a mower, and much more. A tractor can pull these heavy machines and equipment because it has a powerful engine. In fact, it is so powerful it equals the same power of 200 horses.

Before the 1700s, farmers planted crops by spreading seeds by hand. In the early 1700s, a farmer named Jethro Tull invented a seed drill. The seed drill dug small trenches in the soil and dropped seeds into them. Today, this piece of equipment is called a planter. Planters put the seeds in the soil. They have tanks which hold the seeds. The planters have seed meters so the right amount of seeds are dropped into the soil. A row of wheels on the planters cover the seeds with soil after they are dropped into the field.

Farmers used to harvest crops by hand. They would cut the stalks, stack them in large piles, then store them in a silo. (A silo is a cylindrical structure in which grain is kept.) Then the farmer had to separate the grain from the stalk by hand. It took many people to do these two tasks, until Cyrus McCormick invented the reaper, a machine that cut the stalks. The reaper had a turning wheel which moved a blade back and forth to cut the stalks. Then a thresher was invented. The thresher separated the grain from the stalks. Farmers then used a reaper to cut the stalks and a thresher to separate the grain from the stalks.

Since the 1930s, farmers have used machines called combines to pick the grain from the fields (which is also called harvesting). A combine does the job of a reaper and a thresher. A combine separates grain from the stems, as it cuts stalks in the field. The combine stores the grain in a big tank inside the machine. The leftover stalks are blown out the back of the combine. An auger is a long tube on the side of the combine. Inside the auger is a rotating flange (like a screw) that moves the crop from the storage tank and dumps it into a truck or wagon.

In the past, using horses and other farm animals, farmers would cut hay in the fields and rake it into bundles. Then, they would haul it back to the barn to store. Today, farmers use mechanical hay balers. These hay balers cut the hay or straw, and then pack it into square or round bales.

Dairy cows used to be milked by hand. Every day farmers would milk their cows by hand two to three times. Today, most farmers use milking machines. Farmers still milk cows two to three times a day, but it is a much easier process. The farmers attach suction cups to the teats of a dairy cow, and this suction system pulls milk from the cow and pumps it into a storage tank. The storage tank keeps the milk fresh and cool. When farmers had to milk by hand, it used to take two people about two and one-half hours to milk 20 cows. Today, an electric milking machine enables one farmer to milk 20 cows in about 15 minutes!

Materials Needed:

- Set of "Farm Equipment and Machinery Pictures" to display (for teacher use)
- Copies of "Farm Equipment and Machinery Pictures" (for the students)
- "From Old to New" worksheet

Activity Outline:

1. Talk to the students about farm machinery and equipment. Hold up each picture of the "Farm Equipment and Machinery Pictures" and discuss what each did a long time ago or what it does today (depending upon the picture). Pass around the pictures for the students to get a close-up look at them.
2. Pass out the worksheet "From Old to New." Have the students draw a line between the old method of farming to the method used today. Discuss the answers with the students.
3. Pass out copies of "Farm Equipment and Machinery Pictures," one to each student. Not all students will have the same picture. Have the students write a paragraph about their piece of equipment or machinery. The paragraph should contain information about how farmers used the machinery in the past and how they use it now. For instance, if the student has a picture of a planter, the student should write a paragraph about how farmers used to scatter the seeds by hand and now they have a machine that puts the seeds into the ground. The student should also discuss why the newer way is more beneficial.

Discussion Questions:

1. How do farmers plant seeds now? How did they plant seeds in the past?
2. What two pieces of equipment did farmers use to harvest crops in the past?
3. What big machine do farmers use today to harvest crops?
4. What machine do farmers use to pull heavy loads or pieces of equipment?
5. How did farmers used to milk cows? How do they milk cows today?
6. How many times a day does a farmer need to milk the cows?

Related Activities:

1. Have students learn about other types of equipment that farmers use and how they are beneficial.
2. Visit a local implement dealer or invite an implement dealer into the classroom to discuss his/her business, what types of equipment or machinery he/she sells, and how much each piece costs.

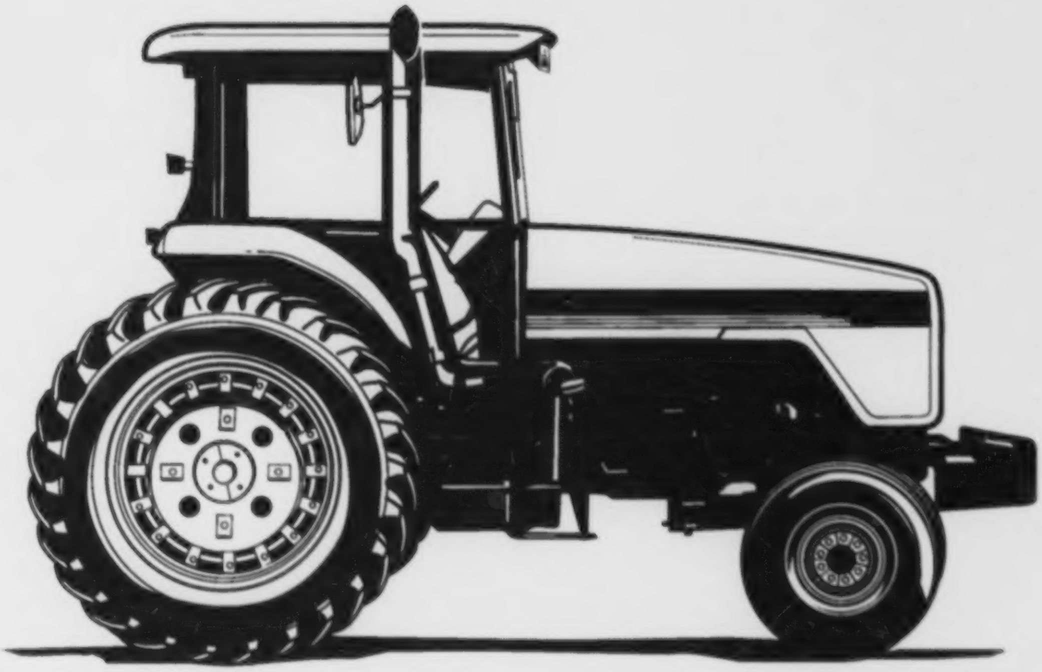
Other Resources:

1. The Illinois Farm Bureau® produces an educational magazine entitled *Ag Mag* 15, called "Safety Sleuths," teaches students about farm safety. Contact your county Farm Bureau® to receive free copies for your classroom.
2. *A Tractor Goes Farming* by Roy Harrington, published by the American Society of Agricultural Engineers.
3. *Harvest Year* by Cris Peterson, Boyds Mills Press, Inc.
4. *Century Farm* by Cris Peterson, Boyds Mills Press, Inc.

To be used with:
Tracking Technology

Name ______________________________

Farm Equipment and Machinery

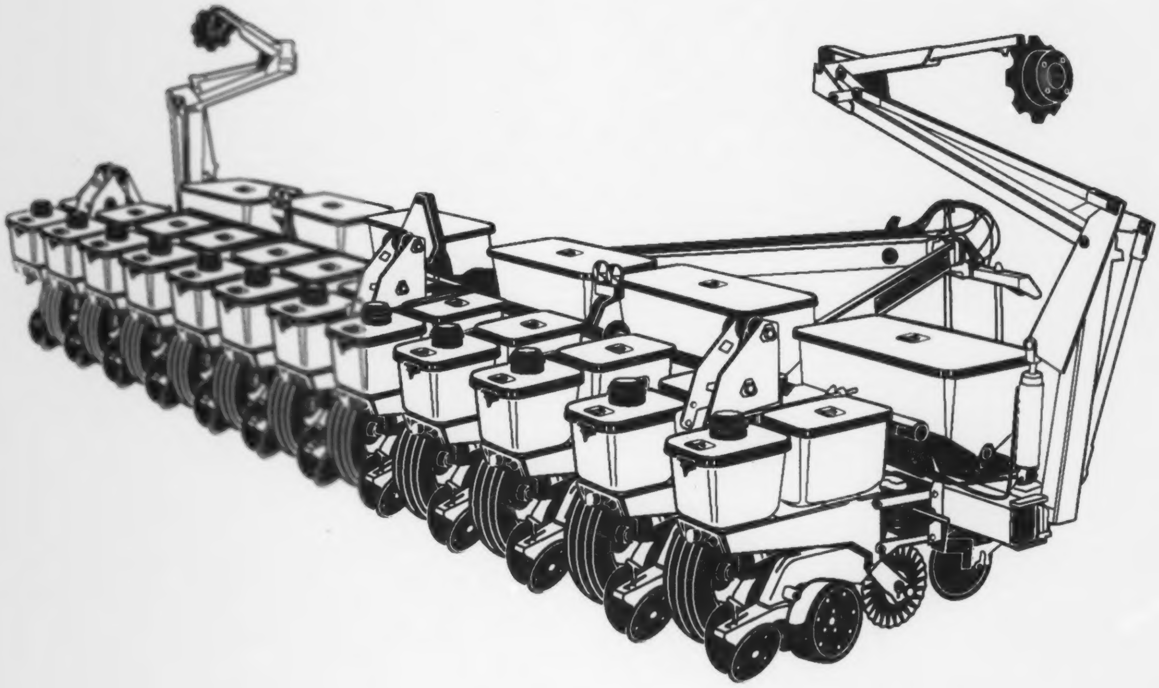


Tractor

To be used with:
Tracking Technology

Name ______________________________

Farm Equipment and Machinery

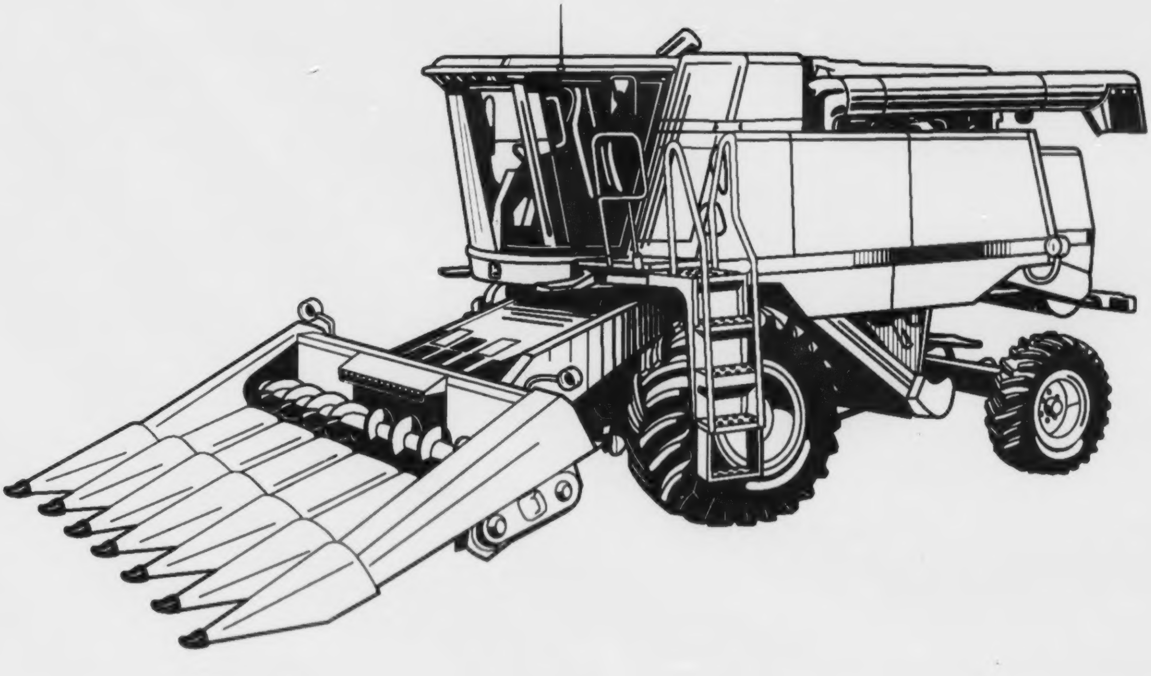


Planter

To be used with:
Tracking Technology

Name ______________________________

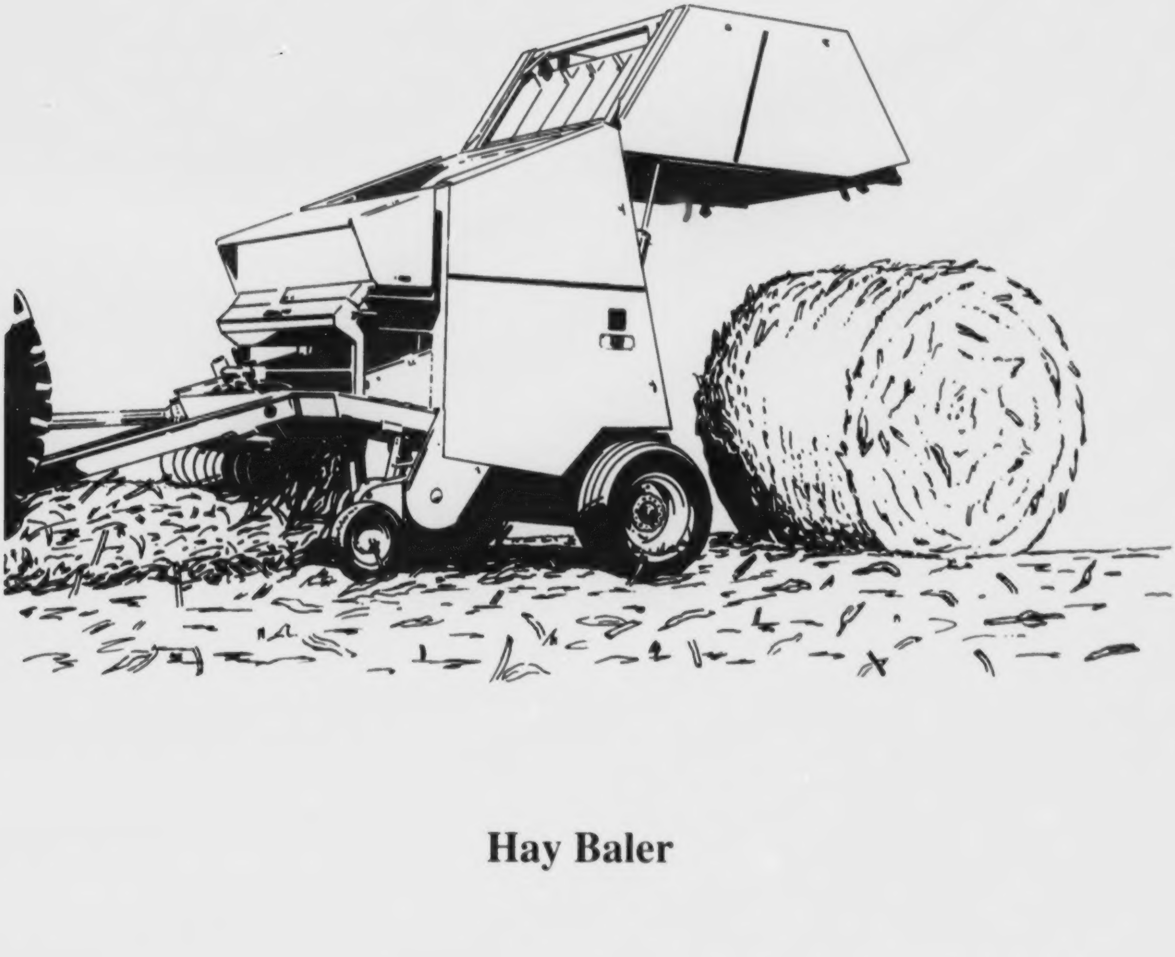
Farm Equipment and Machinery



Combine

To be used with:
Tracking Technology Name ______________________________

Farm Equipment and Machinery

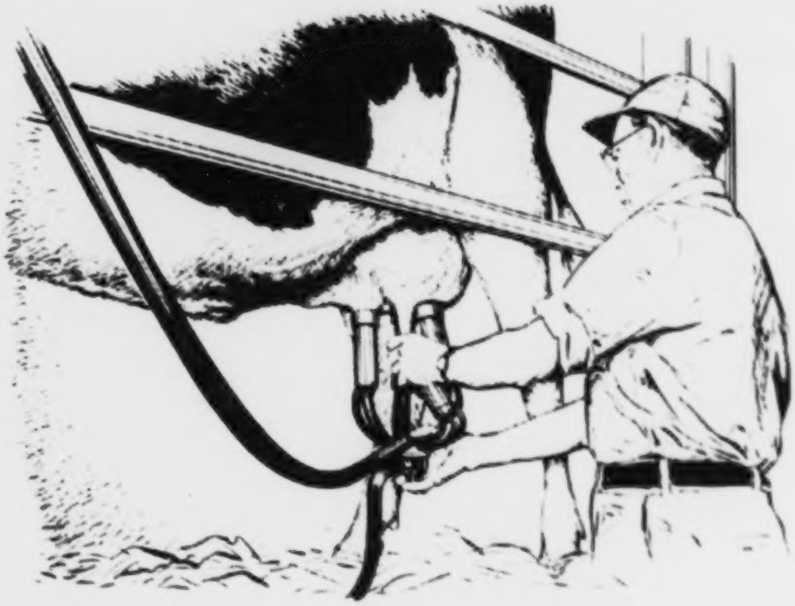


Hay Baler

To be used with:
Tracking Technology

Name ______________________________

Farm Equipment and Machinery



Milking Machine

To be used with:
Tracking Technology

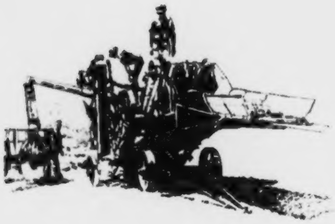
Name ______________________________

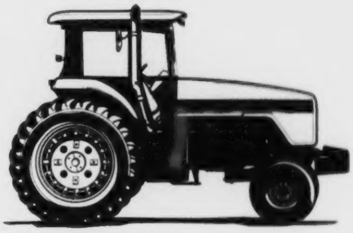
From Old to New

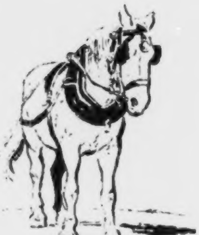
Technology has changed the way people farm. Draw a line to match up the old method to the new method used today.

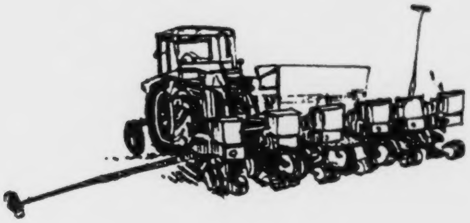
Old Way

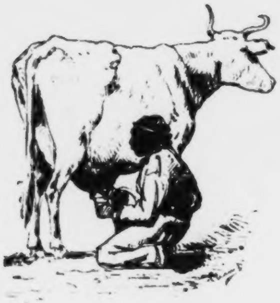
New Way

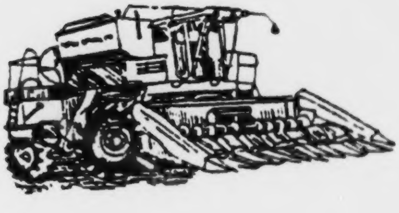


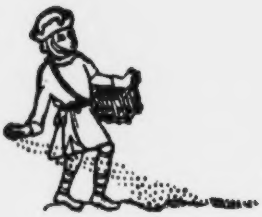


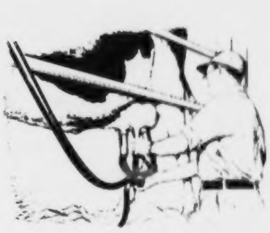












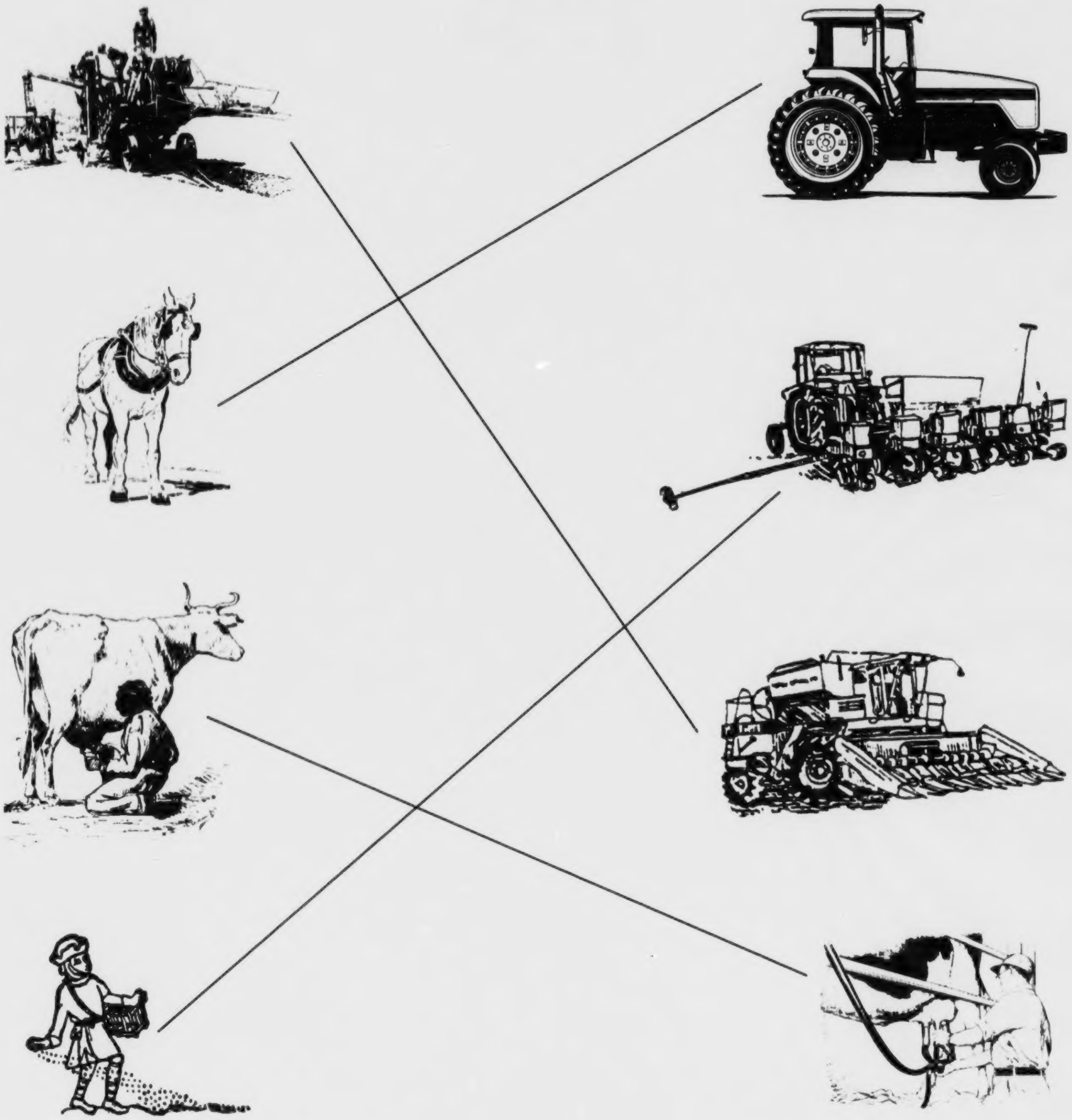
Answer Key

From Old to New

Technology has changed the way people farm. Draw a line to match up the old method to the new method used today.

Old Way

New Way



Corn Exports Visually

Grade Level: 4-6

Approximate Length of Activity: One or two class periods

Objectives:

Teacher:

1. Introduce students to common characteristics of good visual displays of information.
2. Help students learn the extent of U.S. corn exports.
3. Allow students to work together cooperatively.

Students:

1. Learn the extent of U.S. corn exports.
2. Create an appealing, informative visual display.
3. Recognize and use strategies for creating a good display.
4. Work cooperatively with others.

Illinois Learning Standards: 6.B.2a; 6.C.2a; 15.A.2a; 25.B.2; 26.B.2d

Corn is a tall member of the grass family of plants. Other common plants in the grass family are wheat, oats, sorghum, foxtail, and bluegrass. Unlike many types of grasses, corn is an annual plant, meaning that it cannot survive the winter and must be planted again each year. Because we can plant the corn seeds whenever we need corn, we call it a renewable resource.

Corn has a strong, solid stem and long, narrow leaves. Corn leaves encircle the stem and are attached alternately on opposite sides of the stem. Corn plants usually have an extensive root system. Their flowers are small and grow in dense spikes or open, branching clusters called panicles.

Corn is one of nature's most amazing energy-storing devices. A corn seed weighs about one-hundredth of an ounce. Yet this tiny seed can produce a corn plant that will grow seven to 10 feet tall and that will produce between 600 and 1000 seeds. The "seeds" are commonly known as corn kernels. The kernels are arranged in rows along the ear of corn. An ear of corn may have as few as eight or as many as 36 rows, but the number of rows is always even. The kernels will become corn seeds to plant corn for the next year.

The corn seed (kernel) is composed of four main parts: the pericarp, the endosperm, the germ, and the tip cap. Each of these three parts has a role to play in producing a new corn plant. The pericarp is a hard, outer coat that protects the seed both before and after planting. It prevents bacteria and fungi from entering and destroying the seed. The endosperm makes up about four-fifths of the kernel's weight. Its chief function is to provide food energy for the young plant. The germ is the living part of the corn kernel. The germ contains genetic information, vitamins, and minerals that the seed needs to grow. The tip cap is where the kernel was attached to the cob.

Illinois and Iowa are the major corn-producing states in the United States. American farmers use more land for corn than any other crop, and corn provides more food for people than any other crop grown. Altogether, about 4000 of the products in a typical supermarket contain some product or by-product of corn.

In autumn, corn is harvested with combines. Combines are machines which pick, shuck, and shell the ears of corn right in the field. The corn is unloaded from the combine into a truck or wagon with an unloading auger. When the trucks and wagons are filled with corn, the corn is taken to a grain elevator or unloaded into a storage bin on the farmer's farm. A grain elevator is a cylinder made out of poured concrete. When a truck or wagon with grain arrives at the elevator, it is weighed. The clerk at the elevator office subtracts the weight of the wagon or truck from the total weight to determine the weight of the corn. The clerk at the elevator also measures the moisture content and weight of the corn using a sample. Next, the trucks and wagons go to the elevator storage area. Here the corn is dumped into a pit and then drawn into the elevators with augers in a pipe system. Most corn is used for livestock feed. The corn that is not fed to livestock may be processed in mills, used for by-products, or exported.

America exports nearly one-third of our nation's corn crop and produces over one-third of the world's corn crop. Therefore, U.S. corn is in demand. The United States also exports products such as coarse grains, wheat, soybeans, red meats, cotton, poultry meats, fruits, and vegetables. We are able to export these products because they can be grown, raised, or produced in the United States and we have an abundance of them. In 1998, about $53.7 billion worth of American agricultural products were exported. The countries which we export to the most are Japan, Taiwan, Korean Republic, Africa, Mexico, European Union, Columbia, and Saudi Arabia. The process of exporting and importing provides the United States with the goods we need. Exporting and importing also provides other countries with goods that they need.

Materials Needed:

- "Paper Corn Plants" handout
- "Top U.S. Corn Customers 1996-97" handout
- Large sheets of paper (bulletin board paper)
- Coloring materials such as markers, crayons, and colored pencils
- Construction paper (yellow and green)
- Scissors
- Stapler

Activity Outline:

1. Discuss corn, exporting and importing, and the "Top U.S. Corn Customers 1996-97" handout.
2. Ask the students to create a large paper world map on the floor of the classroom.
3. Use the "Paper Corn Plants" instructions to create corn stalks.
4. Visually show the corn that is exported from the U.S. to other countries by placing the paper corn plants on the map. For example, since Africa imported 4.1 million metric tons of corn from the U.S. in 1996-97, place 4.1 paper corn plants on Africa. The corn plant can be cut to 1/10 of it's size to represent .1. (This could also be a math lesson – how much is 4.1 million? Why are we using 4.1 corn plants to represent 4.1 million?
5. Look at the corn plants on the floor map and discuss. What part of the world imports the most corn from the U.S.? What country imports the least?

Discussion Questions:

1. Why are importing and exporting important?
2. What country imports the most U.S. corn?
3. Name some other products the U.S. exports (besides corn).

Related Activities:

1. The Illinois Farm Bureau® has produced an educational magazine on corn called *Ag Mag* 11. Contact your county Farm Bureau® to obtain copies for your classroom.
2. Language Arts Activity: Corn-coctions.
   a. Find products in your home that are made with corn and look at the names and logos.
   b. Research the origins of the product names and logos.
   c. Ask students to create a personalized corn product. They must draw their product, create a name and logo, and explain what their corn product is or does.

To be used with:
Corn Exports Visually

Name ______________________________

Paper Corn Plants

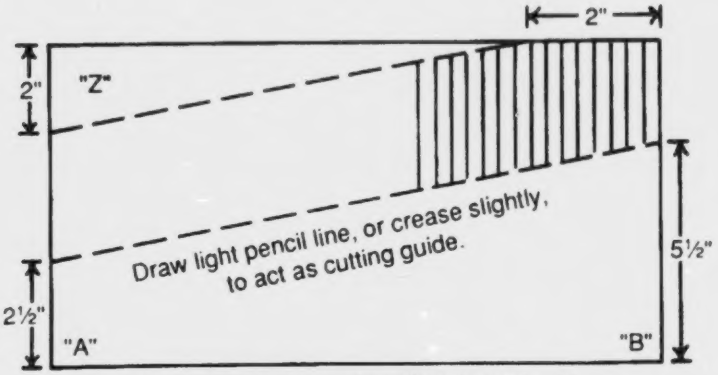
Make a corn plant out of construction paper using the patterns below. You will need scissors, staplers, glue or rubber cement, and yellow and green construction paper.

Directions:

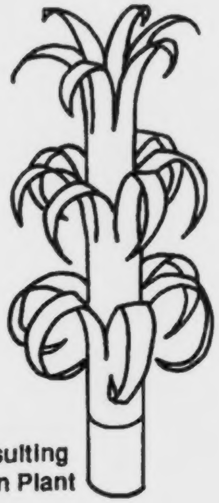
1. Cut off corner "Z" and make vertical cuts in the green paper down to the dotted line. Roll up the corn plant starting at corner "B" and rolling toward "A." Secure the open edge with a staple, glue, or rubber cement.

2. Curl the fringe pieces around your finger, or a pencil, to create the effect of a stalk. Optional: tips of leaves may be cut to a point.

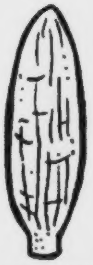
3. Cut an ear of corn from yellow construction paper. You may want to use markers or crayons to decorate the ear with kernels or husks. Glue the ear of corn to the plant.


2"
2"
"Z"
Draw light pencil line, or crease slightly, to act as cutting guide.
5½"
2½"
"A"
"B"

9" x 12" green construction, banner, or mimeograph paper



Resulting Corn Plant



Ear of Corn

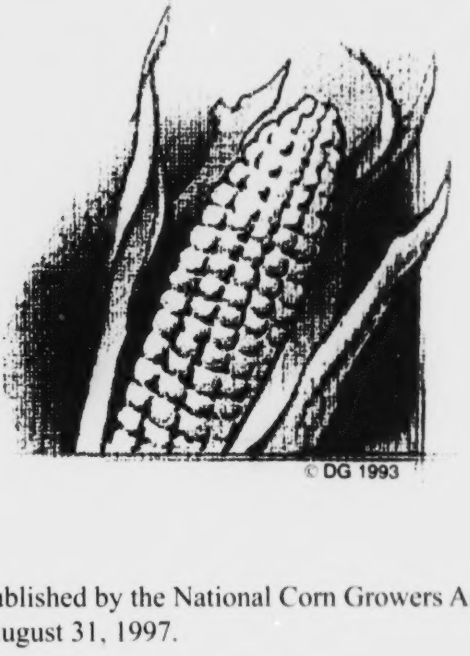
Actual Size

To be used with:
Corn Exports Visually

Name ______________________

Top U.S. Corn Customers
1996-1997

	Country	Millions Metric Tons
1.	**Japan**	**14.7**
2.	**Taiwan**	**5.6**
3.	**Korean Republic**	**5.2**
4.	**Africa**	**4.1**
5.	**Mexico**	**2.9**
6.	**European Union**	**1.8**
7.	**Columbia**	**1.3**
8.	**Saudi Arabia**	**1.0**



Source: *The World of Corn* published by the National Corn Growers Association.
Marketing year data ending August 31, 1997.

Amazing Avenues in Agriculture

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

1. Introduce students to the wide range of occupations in agriculture.
2. Encourage students to consider all jobs involved in the production of one specific agricultural product.

Students:

1. Learn about the wide range of occupations in agriculture.
2. Trace the jobs related in making a loaf of bread and getting it to consumers.
3. Understand the dependence of all consumers on agriculture.

Illinois Learning Standards: 15.A.2a; 15.D.2b; 17.B.2a; 17.C.2b; 17.C.2c

Introduction:

Agriculture is the nation's largest industry and contains over 250 career areas. The agricultural industry consists of all the people who help provide food, clothing, and many other products all over the world. For instance, wheat farmers, the employees at a grain elevator that stores wheat, truckers who transport wheat to the mill, employees at the mill, and workers at the grocery store are all in involved in agriculture. Agriculture does not consist solely of farmers. In fact, only two percent of the population are involved in production agriculture. In America, approximately 22 million people are employed by agriculture. One out of every six jobs is agriculturally related!

In Illinois, food and agricultural product-processing contributes significantly to the state's economy. One Illinois farmer feeds 94 people in the U.S. and 35 people overseas—that's 129 people per year! Illinois is one of the top ranking states in meat packing, soybean processing, dairy manufacturing, corn processing, feed milling, and vegetable processing. Illinois' fertile soil, favorable climate, availability of good transportation, and industry make it a rich agricultural empire.

You may find it surprising that approximately 37 percent of the people employed in Chicago work in agricultural-related fields. They work in agribusiness, communications, science research, government, education, processing and distribution, and marketing and sales.

The number of agricultural occupations is increasing, especially in the areas of international trade, technology, and computerized production and processing.

This lesson will introduce students to the variety of occupations available in the field of agriculture. They will begin this discovery by tracing careers connected to the making of a loaf of bread.

Materials Needed:

- "Wheat: From Farm to You" handout
- "Agricultural Careers" worksheet
- Overhead projector or chalkboard
- Transparency (if using overhead)
- Transparency marker or chalk

Activity Outline:

1. Read and discuss the introduction information to your students.
2. Ask students what jobs are related to the making and selling of a loaf of bread. Brainstorm a list as an entire class writing all related careers on a chart or overhead transparency. Tell the students that the key ingredients of bread are flour (from wheat), eggs, milk, butter, and yeast. Examples of related jobs are wheat and corn producers, seed dealers, dairy producers, grain elevator managers, dairy plant employees, grain processing plant employees, truck drivers, grocery store employees, and bakers. Encourage students to think of all careers involved with each ingredient, processing, transportation, marketing, and sales. Use the handout, "Wheat: From Farm to You," if needed.
3. Have the students complete the worksheet, "Agriculture Careers." When finished, go over the answers.

Discussion Questions:

1. Are you surprised at the number of careers related to the making and selling of one loaf of bread?
2. Does this make it easier to understand how agriculture is the nation's largest industry?
3. Is there someone you know that works in an agriculturally related occupation? If so, how is their job related to agriculture?

Related Activities:

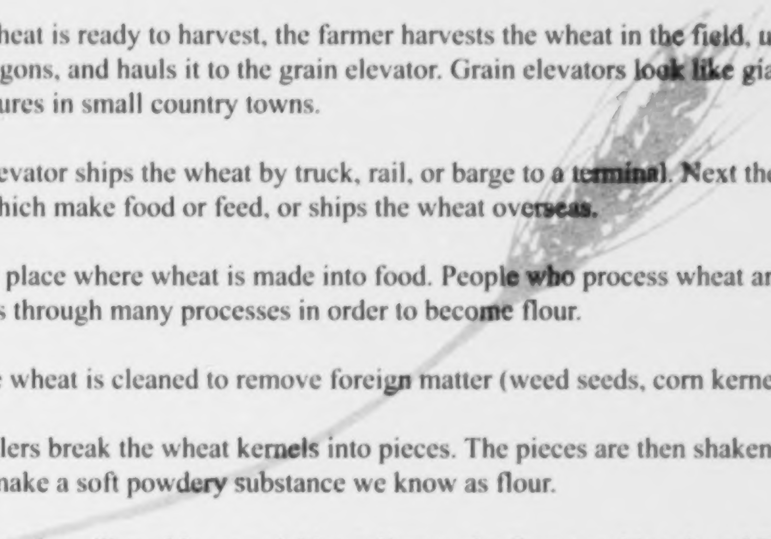
1. Set up a community in the classroom that produces bread. Students can simulate the jobs of wheat producers, dairy plant employees, truck drivers, bakers, etc., and show the bread-making process from start to finish.
2. Repeat this activity with other foods, clothing, or items.
3. Choose one of the listed agricultural-related careers to research. The students could interview someone working in that field. Then, have students present their information to the class orally, visually, and/or by making a page for a book on agricultural occupations.
4. Invite a guest speaker(s) to the classroom to talk about his/her role in agriculture.

To be used with:
Amazing Avenues in Agriculture

Name ______________________________

Wheat: From Farm To You

Farmers plant tiny wheat kernels (another name for seed) in the ground using a seed drill. The seed germinates and begins to grow. It looks like fresh new grass when it comes out of the soil, and it grows to a height of about 24 inches. The wheat plant consists of roots, a stem, long slender leaves, and a head which has kernels.



When the wheat is ready to harvest, the farmer harvests the wheat in the field, unloads the grain into trucks or wagons, and hauls it to the grain elevator. Grain elevators look like giant silos, and may be the tallest structures in small country towns.

The grain elevator ships the wheat by truck, rail, or barge to a terminal. Next the wheat is sold to various industries which make food or feed, or ships the wheat overseas.

A mill is the place where wheat is made into food. People who process wheat are called millers. The wheat passes through many processes in order to become flour.

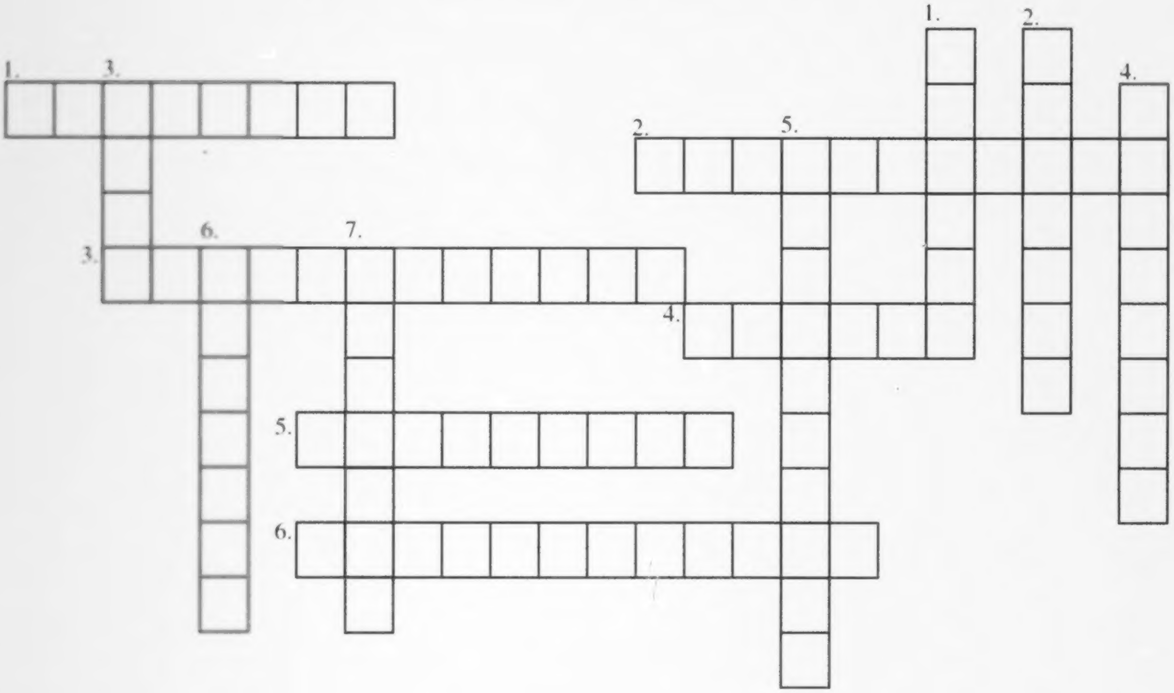
1. The wheat is cleaned to remove foreign matter (weed seeds, corn kernels, beans, stems).
2. Rollers break the wheat kernels into pieces. The pieces are then shaken on screens many times to make a soft powdery substance we know as flour.
3. Next, the miller adds a special ingredient to the flour to whiten it and B-vitamins and iron are also added for nutrients. The flour is shipped in bags to the bakery or to the grocery store.

Bakers like to use wheat flour because it contains a magical protein called gluten. To make dough, active yeast, warm water, and other ingredients are added to the flour. The gluten traps the air bubbles the yeast releases, and causes the dough to rise.

To be used with:
Amazing Avenues in Agriculture

Name ___________________________

Agricultural Careers



Across

1. Sells seed, feed, and equipment.
2. Gives markets and farm updates on the radio.
3. Advises farmers how to feed their animals.
4. Stocks his shelves with food for consumers.
5. Advises farmers and ag-businesses about market trends.
6. Treats sick or injured animals on the farm.

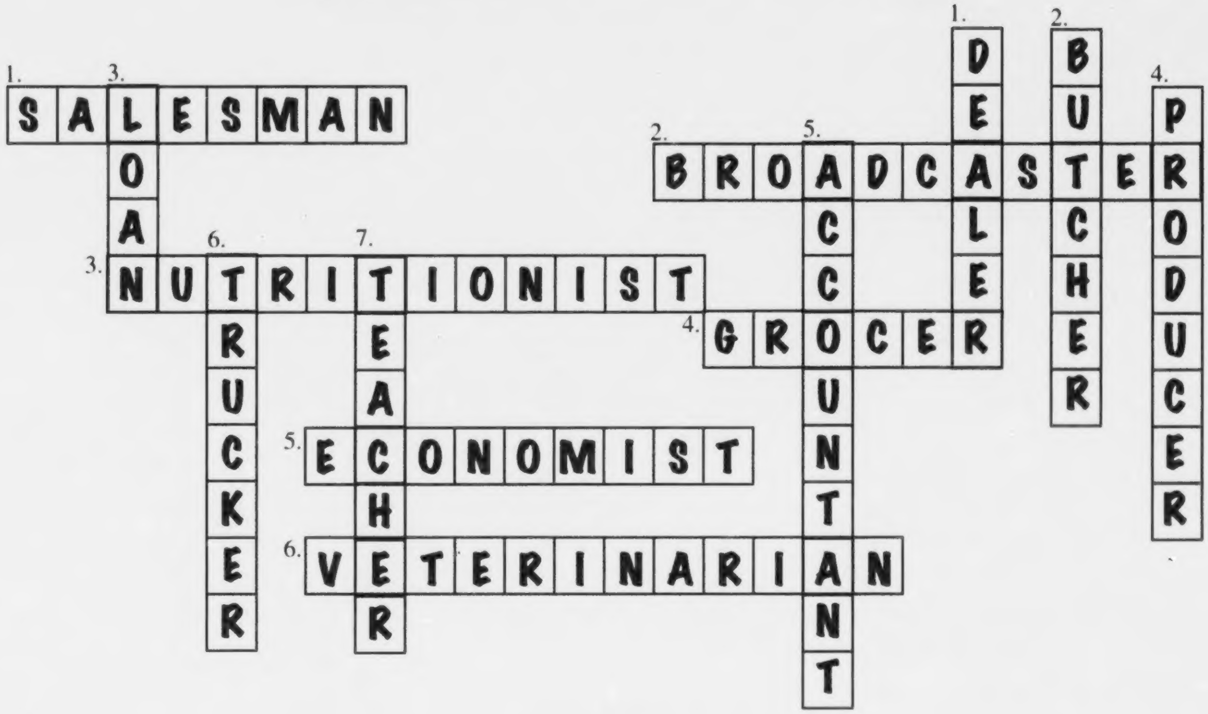
Down

1. A farmer buys equipment from an implement ____________.
2. Someone who processes meat.
3. A banker who lends money to farmers or businessmen.
4. Another name for a farmer.
5. Keeps track of income, expenses, and taxes.
6. Delivers goods in a semi.
7. We learn about agriculture from a ____________.

Teacher
Grocer
Butcher
Economist
Nutritionist
Dealer
Trucker
Producer
Broadcaster
Accountant
Loan
Salesman
Veterinarian

To be used with:
Amazing Avenues in Agriculture **Answer Key**

Agricultural Careers


1. 3. SALESMAN
2. BROADCASTER
3. NUTRITIONIST
4. GROCER
5. ECONOMIST
6. VETERINARIAN
1. DEALER
2. BUTCHER
3. LOAN
4. PRODUCER
5. ACCOUNTANT
6. TRUCKER
7. TEACHER

Across

1. Sells seed, feed, and equipment.
2. Gives markets and farm updates on the radio.
3. Advises farmers how to feed their animals.
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Down

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4. Another name for a farmer.
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6. Delivers goods in a semi.
7. We learn about agriculture from a ____________.

Teacher
Grocer
Butcher
Economist
Nutritionist
Dealer
Trucker

Producer
Broadcaster
Accountant
Loan
Salesman
Veterinarian

Your Own Corner Of Illinois

Grade Level: 4-6

Approximate Length of Activity: Two to three class periods

Objectives:

Teacher:

1. Introduce students to Illinois agricultural products.
2. Encourage students to work cooperatively and constructively.
3. Provide the opportunity to research specific agricultural products.
4. Expose students to possible factors that affect the growing location of specific agricultural products.

Students:

1. Learn what agricultural products come from Illinois.
2. Learn and use research skills to complete a given task.
3. Research the reasons for the location of specific agricultural products.
4. Understand factors that affect the growing location of specific agricultural products.

Illinois Learning Standards: 12.A.2a; 12.B.2b; 17.A.2a; 17.A.2b; 17.B.2a

Introduction:

Illinois is a major agricultural producer of a wide range of products. We produce soybeans, corn, cattle, dairy products, hogs, fruits, grains, vegetables, and nuts. Over 76 percent of land in Illinois is used for agriculture – that's 27.2 million acres! Crops are grown in different areas of the state – depending on the temperature, precipitation, and physical features of the area. For example, fruit trees and berries are grown in southern Illinois rather than northern because the temperatures and frost dates are more appropriate for the crop's growing season.

Illinois is one of the top two soybean producers in the U.S. It is also a center for soybean processing. Decatur, Illinois claims the title of "Soybean Capital of the World." Illinois agriculture is diverse. Different producers are important to farmers in various regions of the state. Illinois continues to rival Iowa for its corn production, and is the national leader in exports of both soybeans and feed grains, primarily corn.

Pork is also an important commodity. Each year, millions of pigs are born and raised on Illinois farms. In fact, Illinois ranks fourth in the United States in pig production. As for dairy production, Illinois ranks twelfth in total cheese production and sixth in ice cream. Our state produces 117,036,000 pounds of cheese each year and 31,205,000 pounds of ice cream each year.

Do you know that in a lifetime the average American will eat …

- Seven 1000 pound steers.
- Enough vegetables to fill 24 pickup trucks.
- 45 acres of corn.
- 1140 pounds of butter and margarine. Each stick stacked end-to-end would be 300 feet taller than the Sears Tower.
- 2025 pounds of lettuce. That's 10,800 trips to the salad bar.
- Five football fields of wheat.
- Enough milk to fill 100 bathtubs.
- 1290 chickens
- 21 pigs, each weighing 240 pounds.
- Enough apples to make more than 1080 pies.

Major farm equipment manufacturers are headquartered in Illinois. Feed mills, which turn basic grains and oilseeds into livestock feed, dot the countryside. The Illinois, Mississippi, and Ohio Rivers are used to transport Illinois farmers' grain to New Orleans. There it is loaded on ships traveling all over the world. Major grain and livestock futures exchanges in Chicago attract attention daily from across the globe.

Illinois farmers spend over $5.5 billion yearly for production expenses such as seed, fuel, hired labor, machinery, and farm mortgage debt interest. This translates into income for wage earners and businesses in non-farming sectors of the economy as well. For example, the purchase of a new tractor generates income not only for the local implement dealer, but for the assembly worker at the factory, stockholders in the manufacturing company, and truckers who transport the tractors from the factory. Agriculture is big business in Illinois.

Materials Needed:

- "Illinois Farm Products" sheet – one copy for each student and one transparency for the teacher
- "What's In It? Where Does It Come From?" worksheet
- Research materials
- Poster boards, construction paper, or any materials students need for their presentations
- Coloring supplies (markers, colored pencils, crayons)

Activity Outline:

1. Using the "Illinois Farm Products" transparency, discuss agricultural products that are found in Illinois and in your area (the counties in your area).
2. Have students use reference materials (encyclopedias would be best) to color the worksheet, "Illinois Farm Products," to show the temperature, precipitation, or physical features of Illinois. In groups of three, each student can complete one of three factors that may affect the location of various products.

3. Sharing colored maps and keys, the groups will decide why certain agricultural products are found in some areas and not in others. Discuss the factors needed for certain crops and livestock to survive. The students may find it necessary to research some of the products listed to learn the type of climate and soil that is needed to grow or raise each product. To save time, the teacher can assign each group a part of the product list so each is researched by only one group.
4. Each group needs to present their findings to the rest of the class. This may be done orally or with various visuals (such as posters, pictures, etc.) All students will learn about the reasons for growing locations of each of the products listed on the map, without having to research all of them.
5. Have students complete the worksheet "What's In It? Where Does It Come From?"

Discussion Questions:

1. What determines where products are grown in Illinois?
2. What are some of the best examples of products grown in a specific area because of precipitation? Temperature? Soil type?
3. What crops seem to be grown in most parts of Illinois? What crops are grown in a small portion of the state?
4. What crops are grown in your county (area)?
5. What foods are made with crops and livestock from Illinois?

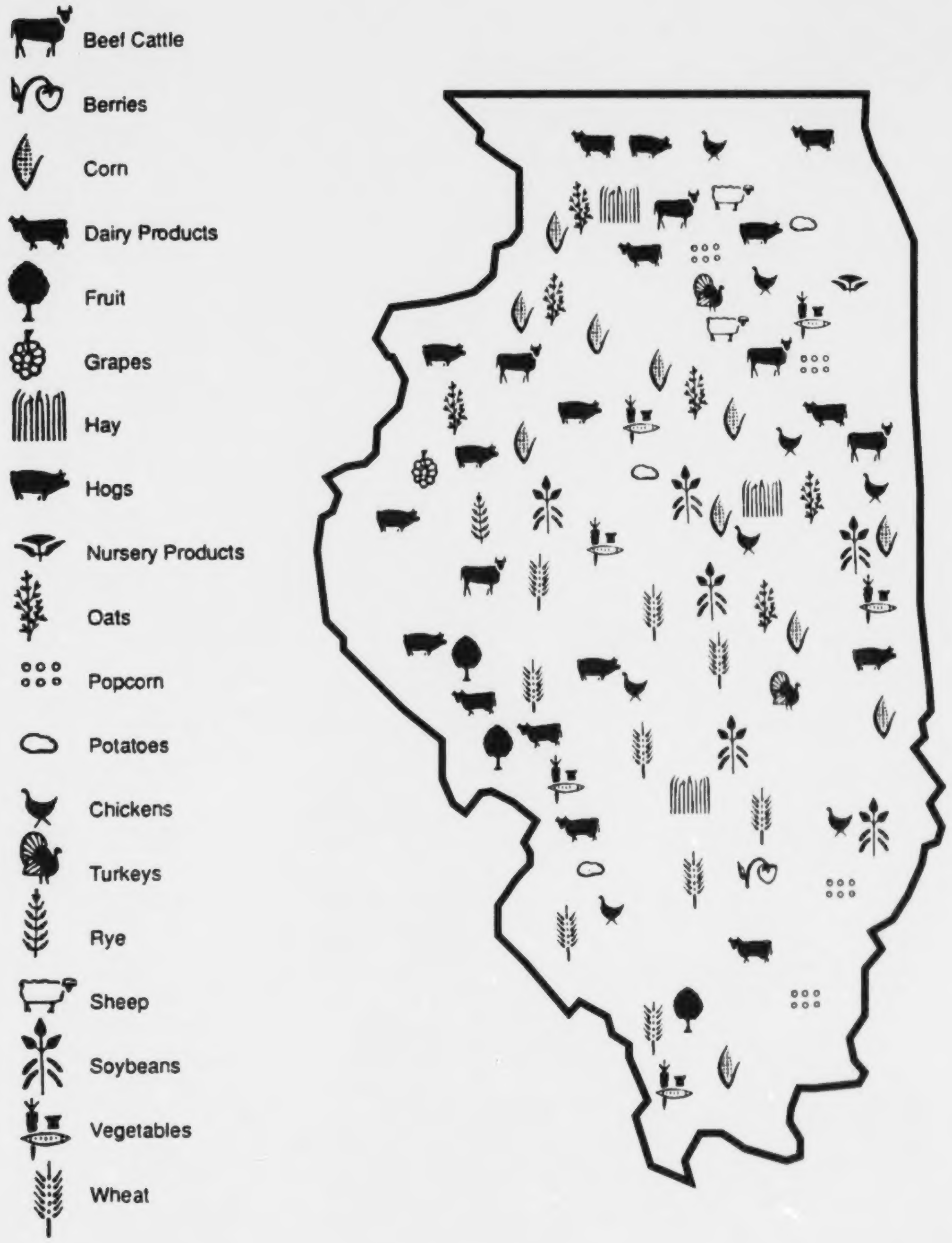
Related Activities:

1. Use the product map as a list of agricultural products for students to research. Each student (or group of students) could then make a presentation to the class introducing the other students to that product.
2. Instead of coloring the worksheet to show temperature, precipitation, or land type, students could color and label the county in which they live and the surrounding counties. Students should identify the major agricultural products of their home area by highlighting the appropriate symbols and names in the list on the left of the page.
3. Field trips could be taken to area farms to see how local products are raised or grown, or to food processing companies.

To be used with:
Your Own Corner of Illinois

Name ______________________________

Illinois Farm Products


Beef Cattle
Berries
Corn
Dairy Products
Fruit
Grapes
Hay
Hogs
Nursery Products
Oats
Popcorn
Potatoes
Chickens
Turkeys
Rye
Sheep
Soybeans
Vegetables
Wheat

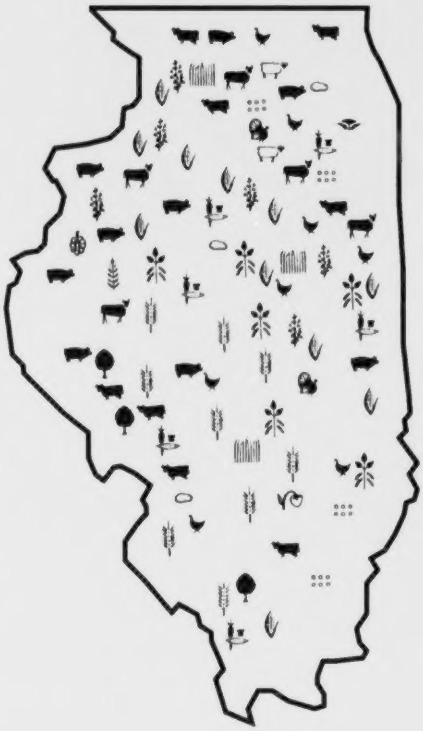
To be used with:
Your Own Corner of Illinois

Name ______________________________

What's In It?
Where Does It Come From?

There are lots of foods we eat every day that are made from Illinois farm products. Can you name at least one farm product in each of the following foods? Look at the Illinois Farm Products map and see which part of the state it comes from.

Food	**Farm Product**	**Part of Illinois Where Grown**
Corn flakes	____________	__________________________
Flour	____________	__________________________
Bacon	____________	__________________________
Cake	____________	__________________________
Hot dogs	____________	__________________________
Spaghetti	____________	__________________________
Potato chips	____________	__________________________
Ice cream	____________	__________________________
Chicken noodle soup	____________	__________________________
Cooking oil	____________	__________________________
Hamburger	____________	__________________________
Margarine	____________	__________________________
Pizza	____________	__________________________
Oatmeal	____________	__________________________



Animal Feed Needs

Grade Level: 4-6

Approximate Length of Activity: Two class periods

Objectives:

Teacher:

1. Help students understand the role art plays in product design.
2. Help students see how advertising influences our choices.

Students:

1. Discuss the elements necessary in advertising that influence consumers' choices such as color, line, design, form, and layout.
2. Study an animal feed label and identify such things as how ingredients are listed, the nutrition, package size, feeding instructions, and how the label is designed.
3. Discuss cleanliness when working with food.
4. Work together cooperatively to achieve a task.

Illinois Learning Standards: 15.B.2a; 22.A.2b; 22.B.2; 26.A.2e; 27.A.2b

Introduction:

There is a wide variety of art forms used in the advertising field today. These forms influence what we buy. Labels on food products help us to understand what we are eating and what we feed our pets. Just like people, animals need a well-balanced diet to stay healthy. Labels will provide us with this information. The front of a label usually has a picture or word that tells you the kind of animal feed. Animal feed is a mixture of products called "ingredients." These are listed from the largest amount of ingredient to the smallest.

An animal feed label must have a list of the nutrition the feed supplies. This is called a "guaranteed analysis statement." This list must have three things: protein, fat, and fiber. The label will tell you if the feed is a complete and balanced diet. The package size tells you how much food you are buying. Most labels also include a list of feeding instructions. Labels give us much information if we take time to read them.

Materials Needed:

- "Make Some 'Puppy Chow' You Can Eat" recipe sheet
- Sample bags of pet foods (different types)
- Brown grocery bags (one for each student)
- Markers and crayons
- Scraps of construction paper
- Glue
- Scissors
- Rulers
- Sandwich size resealable plastic bags
- Microwave oven or hot plate

  Ingredients/materials needed per group:
  - Bowl or sauce pan
  - Wax paper
  - 1 box of cereal (rice, corn, or wheat squares – 12 to 15 ounces)
  - 1 cup chocolate chips
  - 1 cup peanut butter
  - 1 stick margarine or butter
  - 1 to 1 1/2 cups powdered sugar
  - Mixing spoon
  - Measuring cups
  - Cookie sheet
  - Large resealable plastic bag (gallon size)
  - Large bowl

Activity Outline:

1. Divide the class into groups of four to five students each. Give each group a bag of pet food. The students should look at the feed labels.
2. Discuss with the students why it is important for us to eat healthy. Then discuss why it is important for pets and other animals to eat healthy. Have each group read aloud some of the main ingredients in their pet food product. (The first two or three ingredients will do.) Does the class know what these ingredients are?
3. Now have the groups look at the design of the bag – the use of color, design, spelling, neatness, and creativity that went into advertising this product. Have each group critique their pet food product and present it to the class. Let each group state why they like the product's advertisement or why they do not like the advertisement. What would they do different?
4. Have each group get their supplies to make "Puppy Chow." Hand out the "Make Some 'Puppy Chow' You Can Eat" recipe sheet. Help the students make their batch of "puppy chow." (Please assist students in using the microwave.)

5. While the "puppy chow" is cooling, have each student design a pet food product on a brown grocery bag. Each product needs to have a name and a pet feed label stating the ingredients. The students can be creative in their ingredients but they need to make sure that they can prove their ingredients are nutritious.
6. Have each student present their product and tell the class what it is and the ingredients in it. Have them explain why each ingredient is nutritionally good for the animal.

Discussion Questions:

1. What types of ingredients were listed in your "real" bag of pet food?
2. Why do animals need to eat healthy foods?
3. Does the name and design of the bag advertise the product in a positive manner? Would you buy this because of the design?
4. Do all feed labels give us the information we need?
5. What is something that is important to you that you think advertisers should keep in mind when designing and promoting a product?

Related Activities:

1. The Illinois Farm Bureau® Ag in the Classroom produces an educational magazine called *Ag Mag* 7 with information and activities on animal care. Call your county Farm Bureau® obtain copies for your classroom.
2. Write a funny story about a pet and different ways to take care of it.
3. Make "Pig Puffs" as seen on the accompanying worksheet.
4. Make a three-dimensional pet out of a paper plate to add to the bulletin board.
5. Research other advertising techniques or have a commercial artist visit the classroom to tell what he/she does.

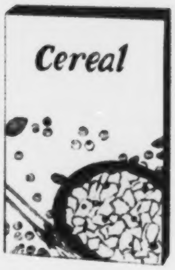
To be used with:
Animal Feed Needs

Name ______________________

Make Some "Puppy Chow" You Can Eat

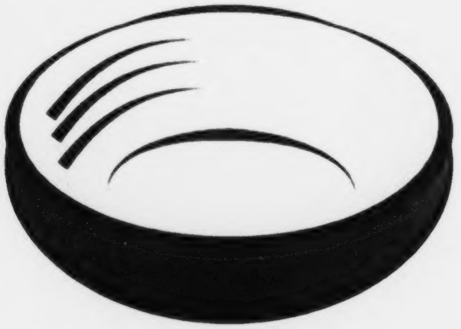
Here's what you need:

1 box	square cereal (rice, corn, or wheat – 12 to 15 ounces)
1 cup	chocolate chips
1 cup	peanut butter
1 stick	butter or margarine
1-1 1/2 cups	powdered sugar
	large bowl
	cookie sheet
	waxed paper
	large resealable bag



Here's what you do:

1. Mix together butter or margarine, peanut butter, and chocolate chips in bowl. Microwave on HIGH one to one-and-one-half minutes until smooth (stir after one minute).
2. Pour the cereal into a separate large bowl.
3. Pour melted mixture over cereal and stir until mixed.
4. Pour powdered sugar into a large resealable bag and pour in cereal mixture.
5. Close top of sack tightly and shake until cereal is coated with sugar.
6. Pour onto cookie sheet covered with waxed paper. Let dry for 2 hours.
7. Eat it up! Or store in a covered container to keep it fresh!



This worksheet is from *Ag Mag* 7, an educational magazine for kids about animals, from the Illinois Farm Bureau®. Call your county Farm Bureau® to obtain copies for your classroom.

To be used with:
Animal Feed Needs

Name ______________________________

Pig Puffs

Shape the dough into pigs, bake them, and then serve them warm.

What you need:

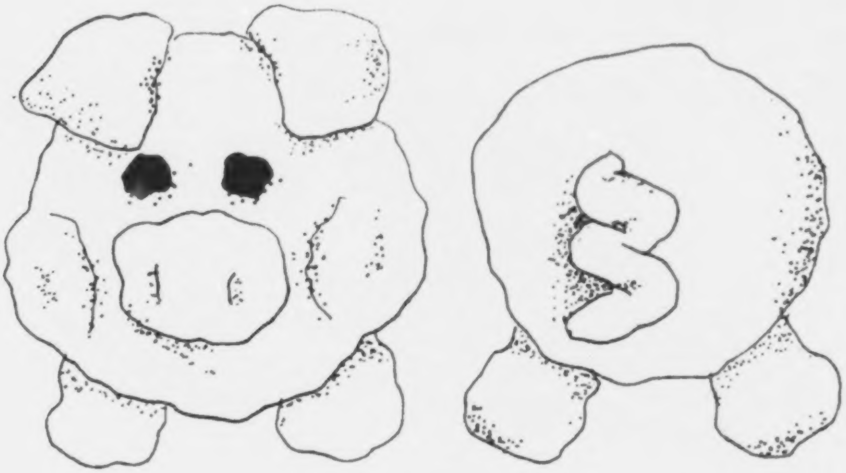
- Rolling pin
- Refrigerated biscuit dough
- Flour
- Small spoon
- Milk
- Custard cup
- Pastry brush
- Baking sheet
- Raisin, tiny chocolate pieces, or nuts
- Shortening
- Bottle opener

1. Roll or pat the refrigerated biscuit dough to half-inch thickness on a lightly floured surface. For the pigs' bodies use 5 circles of dough. Use the remaining biscuits for ears, snouts, tails, and feet.

2. To make pig faces, roll small pieces of the extra dough into small balls for the ears, noses (snouts), and feet. Pour a small amount of milk into custard cup. Brush each dough piece with milk to help it stick to the pig's body and face. Roll a small piece of dough on the counter to make a "snake" for a pig's tail.

3. To finish the pig faces, make cheeks by cutting deeply into the dough with a spoon. Use the pointed end of a bottle opener to cut the snout and mouth.

4. Carefully place the Pig Puffs on a greased baking sheet. Use raisins, chocolate pieces, or nuts to make eyes. With adult help, bake in a 450°F oven about 6 to 8 minutes. Makes 5 biscuits.



Baa, Baa, Black Sheep

Grade Level: 4-6

Approximate Length of Activity: One to two class periods

Objectives:

Teacher:

Use an integrated curriculum to help students learn about the many products that come from sheep.

Students:

1. Know the basic parts of a sheep.
2. Learn about the many products we get from sheep.
3. Understand the process that wool goes through to get from the farm to the store.
4. Use wool in a creative way to show its various textures.

Illinois Learning Standards: 12.A.2a; 15.A.2a; 26.A.2f; 26.B.2d

Introduction:

A male sheep is called a ram, a female is a ewe, and a baby is a lamb. Sheep eat grasses, grains, woody plants, broadleaf plants, and weeds. They are ruminants, which means they have four parts to their stomachs, just like cows. Sheep are raised in groups called flocks (five to 1000 sheep) or bands (1000-2000 sheep). There are over 35 breeds of sheep in the U.S. and over 900 in the world! Sheep have split hooves to help them climb rocky hills. They do not have top front teeth, but the roof of their mouth is hard. Sheep and lambs are known to be gentle animals and are easily attacked by coyotes, bears, foxes, and eagles. Many shepherds/caretakers of sheep use guard dogs to protect their sheep and working dogs to herd their sheep.

Sheep provide us with wool, the fuzzy covering that grows on them. Sheep are sheared (given a haircut) once a year. The wool that comes from each sheep is called a fleece. An average fleece weighs 8.5 pounds. Wool is taken to a warehouse to be sorted and then to a mill to be cleaned, carded, combed, and spun. It is used for clothing, blankets, carpets, and other materials.

Sheep also provide us with meat. Meat from sheep less than a year old is called lamb. Lambs are usually taken to market when they are four to six months old and weigh 120-135 pounds. Meat from a sheep over a year old is called mutton. Lamb is a good source of protein, which helps our bodies build strong bones and muscles. Lamb is also a good source of zinc, vitamin B, and iron. Vitamin B and iron give us energy, while zinc keeps our hair healthy and shiny. By-products from sheep are used in shampoo, soap, crayons, medicines, paints, tires, dog food, dice, ice cream, bandages, marshmallows, artist brushes, baseballs, shoe cream, chewing gum, and detergents.

This lesson is designed to help students learn more about sheep and their importance. The students will learn about various products from sheep, how their digestive system works, how wool is processed, and a basic vocabulary about sheep.

Materials Needed:

- "Bulletin Board Display Layout"
- "Bulletin Board Display Cards" (six total)
- "Wool Information" handout
- "Wool Production" handout
- Various products made from sheep: felt, baseball, yarn, sweaters, tennis balls, strings on a racquet, marshmallows, etc.
- Wool from sheep in various stages. (Try to get this from a farm, or see the Other Resources section at the end of the lesson for contacts.)
- Wool yarn or scraps of wool for weaving or collage activity

Activity Outline:

1. Take the "Bulletin Board Display Cards" and place on a bulletin board according to the "Bulletin Board Display Layout."
2. Show students various products from sheep. Ask students what similarities they see in these products. Then tell the students that all are products made from sheep.
3. Give the students some facts about sheep using the "Wool Information" and "Wool Production" handouts. They have no top teeth! This is so they can graze close to the earth and not pull up the roots of a plant. Their hooves are split so they can walk on very uneven ground. They are ruminants, which means sheep have four compartments to their stomach. Sheep are so timid that they need to be tended by shepherds and sheep dogs at all times. The fleece from one sheep is enough to make a man's suit.
4. Next, explain the process of getting wool from sheep. Refer to the bulletin board display. If you have obtained some wool, pass out the virgin wool to the class and point out the dirt and oil in the product. This is the first step after the shearing of the sheep. The fleece is removed each spring and is taken off in one piece in about five minutes. Next the wool is washed and all the dirt and oil are removed. This oil is used to make lanolin. Pass out an example of cleaned wool. Then the wool is corded, or combed to straighten the fibers. Next the wool is spun into yarn. Finally the yarn is weaved into fabric or knit into a piece of clothing. Use the wool production sheet to reinforce this process.

5. Depending on what is available – yarn, wool material scraps, etc. – have the students create an art project. It could be a weaving project. This could be done with yarn or with long strips of wool materials. A collage would also be a good project. The different colors and textures of wool products lend themselves well to this. (A thrift shop might be a good source for wool materials found in old clothes.)

Discussion Questions:

1. What are some products besides wool that come from sheep?
2. What facts do you know about sheep?
3. What processes does wool go through to become fabric or yarn?

Related Activities:

1. Illinois Farm Bureau® Ag in the Classroom produces an educational magazine called *Ag Mag* 13, "Simply Sheepish," with information and activities on sheep. Contact your county Farm Bureau® to receive free copies for use in your classroom.
2. Take a field trip to a farm to see sheep shearing.
3. Invite someone who spins and weaves wool into your classroom.

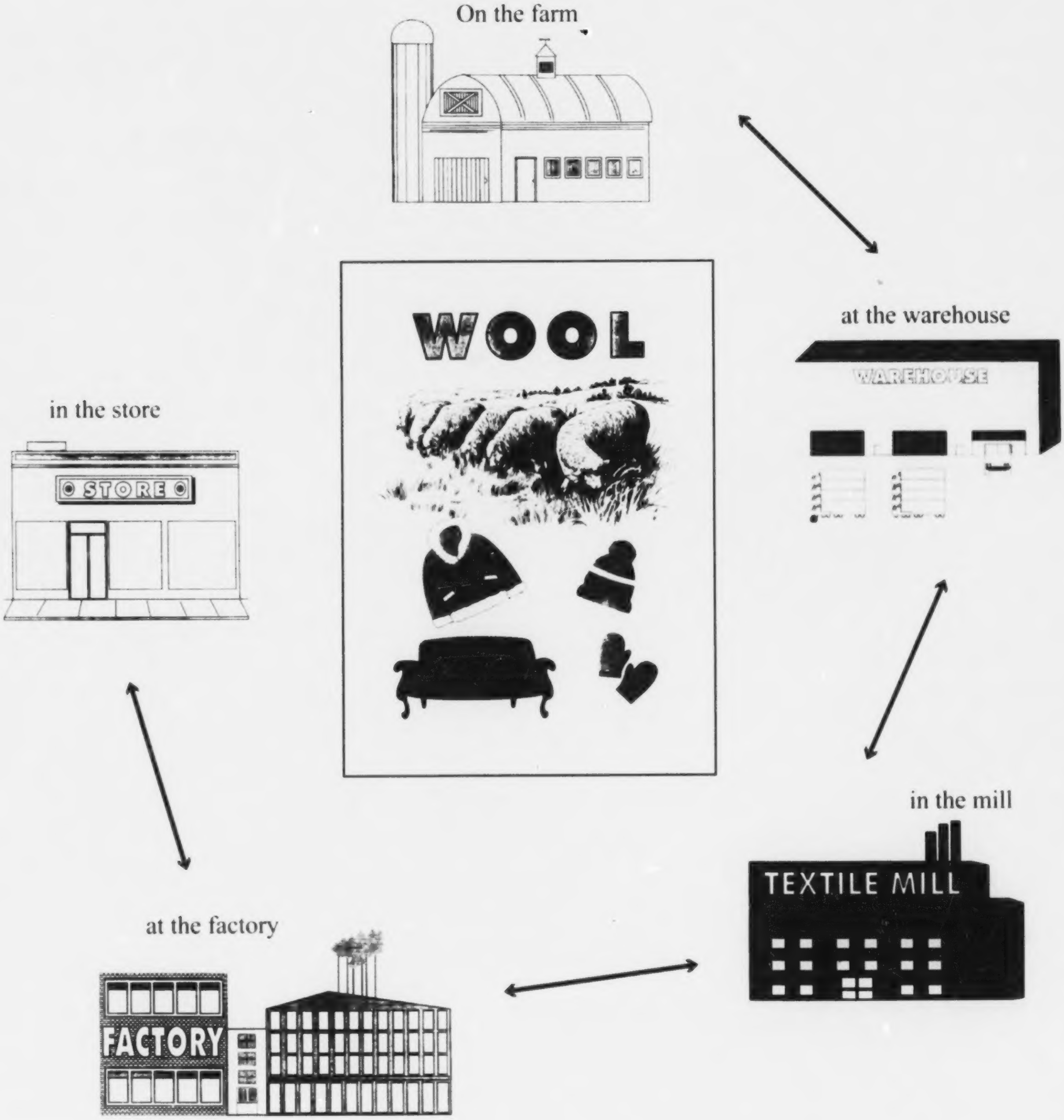
Other Resources:

1. American Sheep Industry Association, 6911 S. Yosemite, Englewood, CO 80112-1414.
2. Natural Fiber Research and Information Center, University of Texas at Austin, PO Box 8180 University Station, Austin, TX 78712.
3. The Wool Bureau, Inc., 360 Lexington Avenue, New York, NY 10017-6572.
4. New York Ag in the Classroom, Cornell University, 400 Kennedy Hall, Ithaca, NY 14853.
5. *Wool Fiber in The Making* from Pendleton Woolen Mills. This chart has actual samples of wool at various stages of production. Available free to educators. Call 1-800-760-4844 or visit their web site at http://www.pendleton-usa.com.
6. *Sheep Booklet Kit* and *Spinning Kit* from Ag Experience. *Sheep Booklet Kit* (4 – 6 grades) includes a booklet and blackline masters, sheep puppet pattern, sheep facts, activities, and a resource list. *Spinning Kit* includes combed, carded wool, two doweling drop spindles, lesson plan, and labeled wool samples. Ag Experience, 3144 North "G" Street, #125-141, Merced, CA 95340. Phone (209) 358-9057 or (209) 384-1376. Cost is $12.00 for the *Sheep Booklet Kit* or the *Spinning Kit*.

To be used with:
Baa, Baa, Black Sheep

Layout

Bulletin Board Display

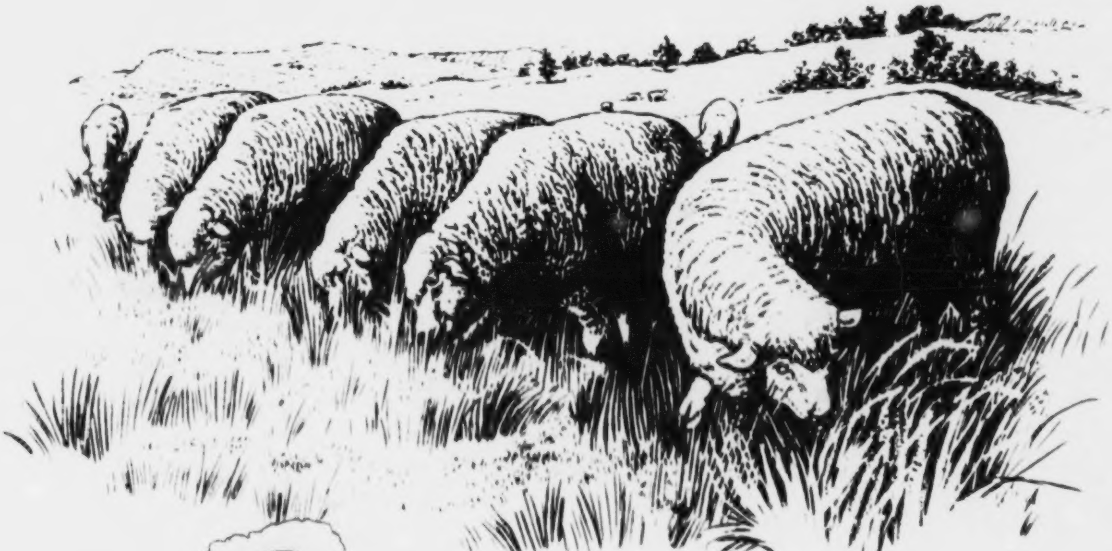

On the farm
at the warehouse
WAREHOUSE
WOOL
in the store
STORE
in the mill
TEXTILE MILL
at the factory
FACTORY

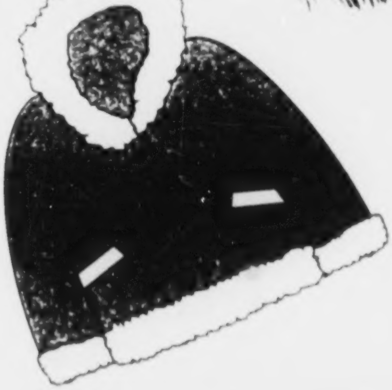
Adapted from "It's a Puzzlement!," K - 6 Classroom Activity Kit by National Farm-City Council, Inc.

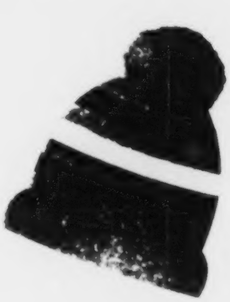
To be used with:
Baa, Baa, Black Sheep

Bulletin Board Display Card

WOOL

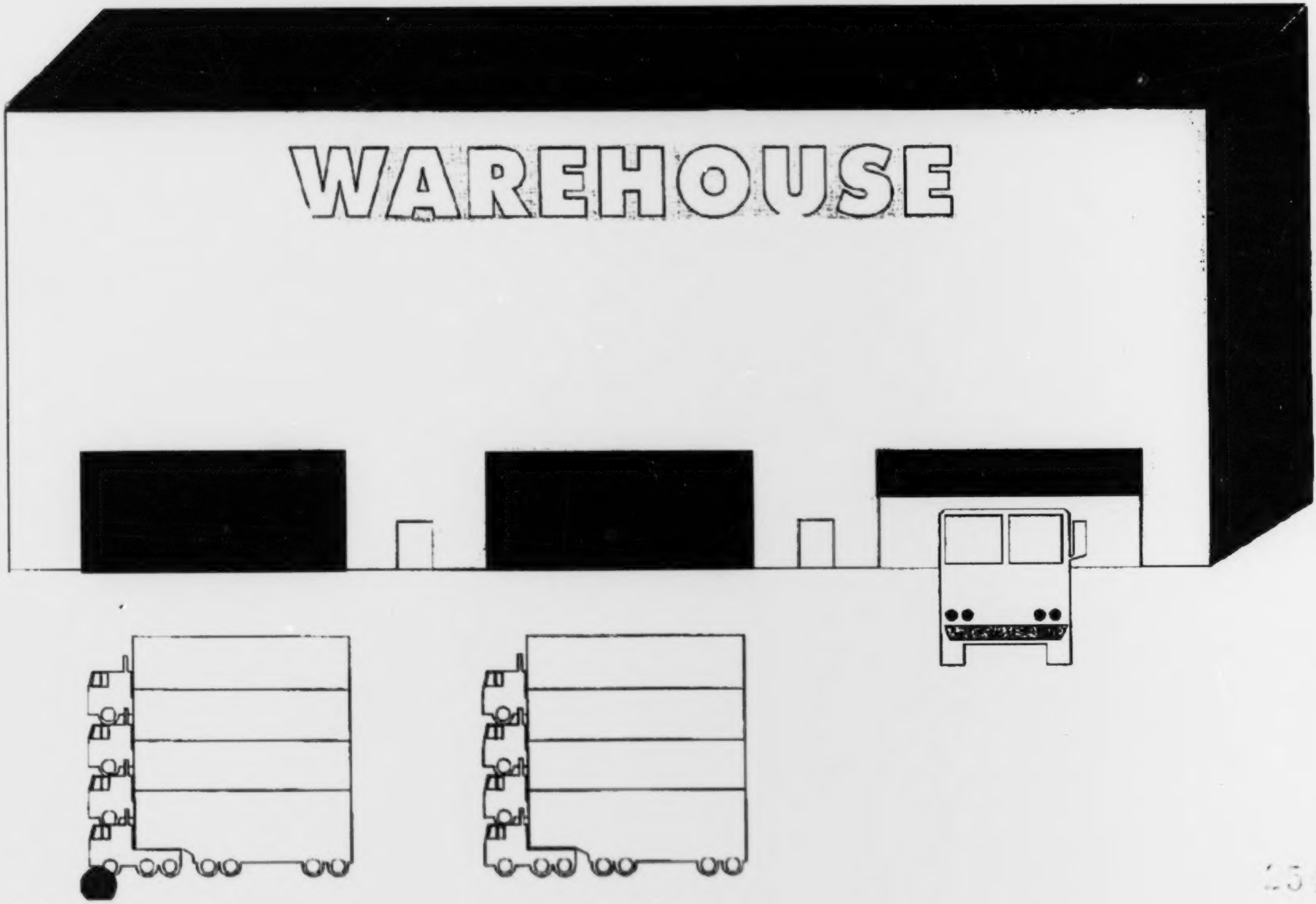






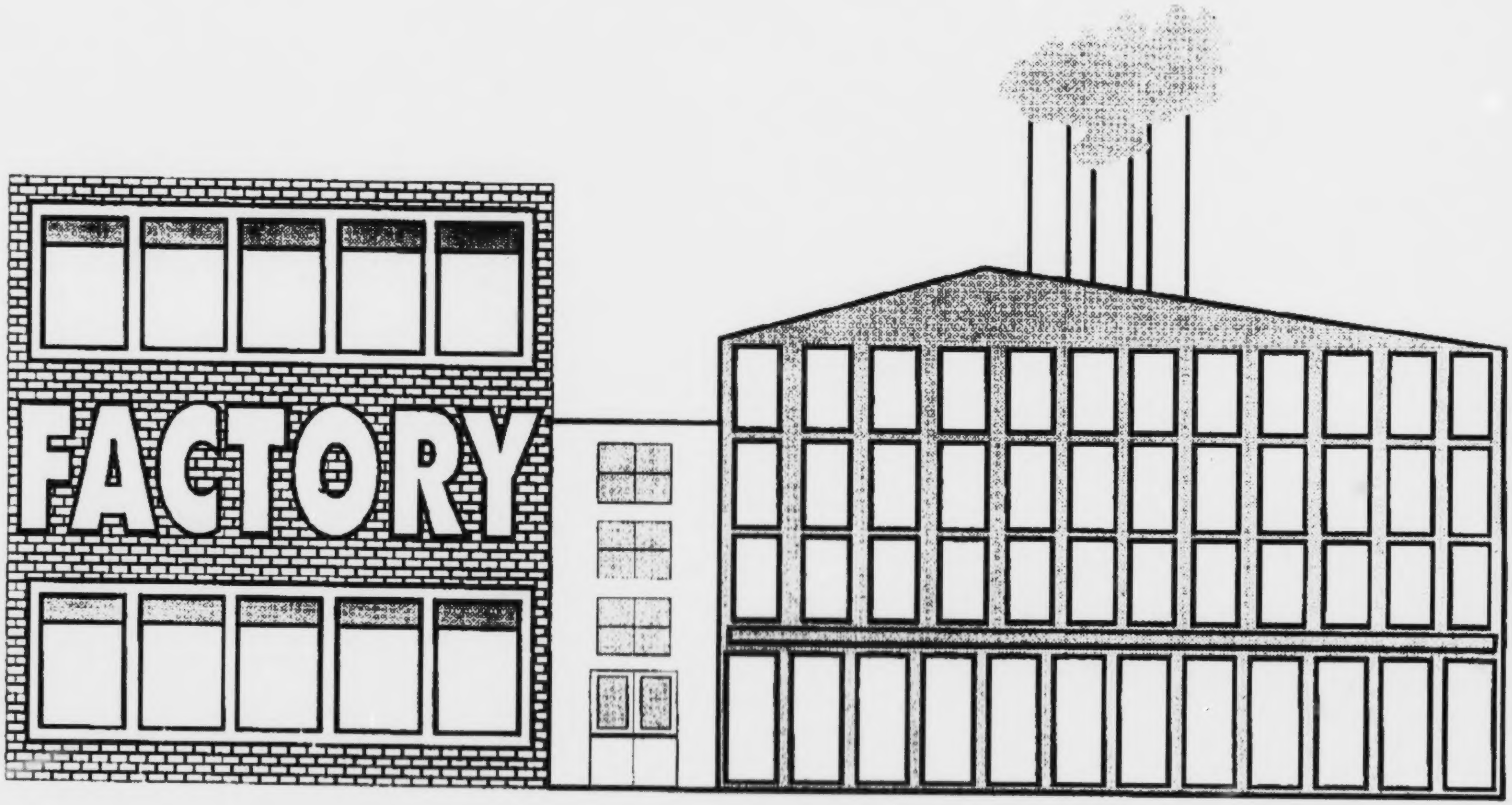
WS- 251

Bulletin Board Display Card



To be used with:
Baa, Baa, Black Sheep

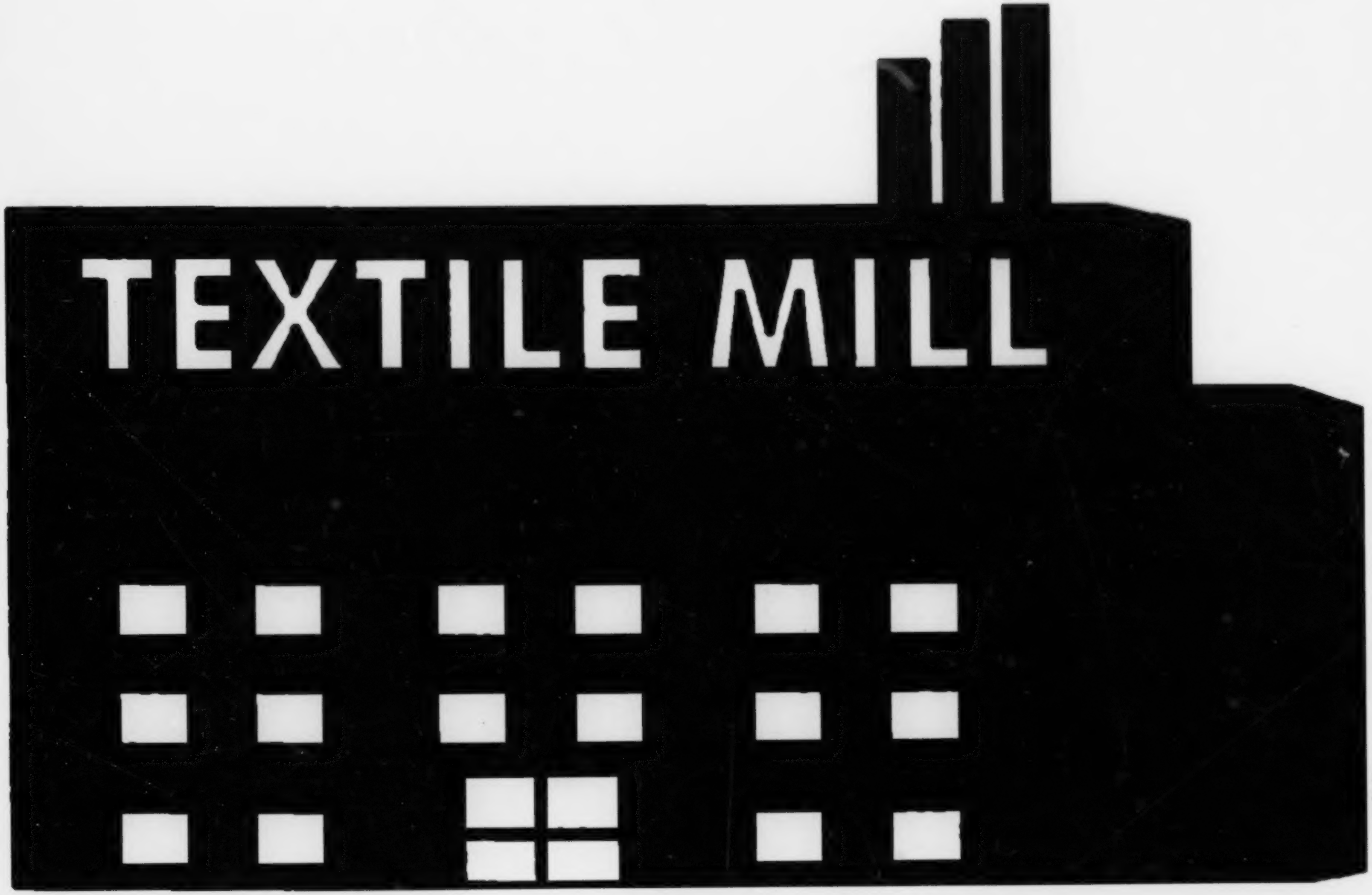
Bulletin Board Display Card



To be used with:
Baa, Baa, Black Sheep

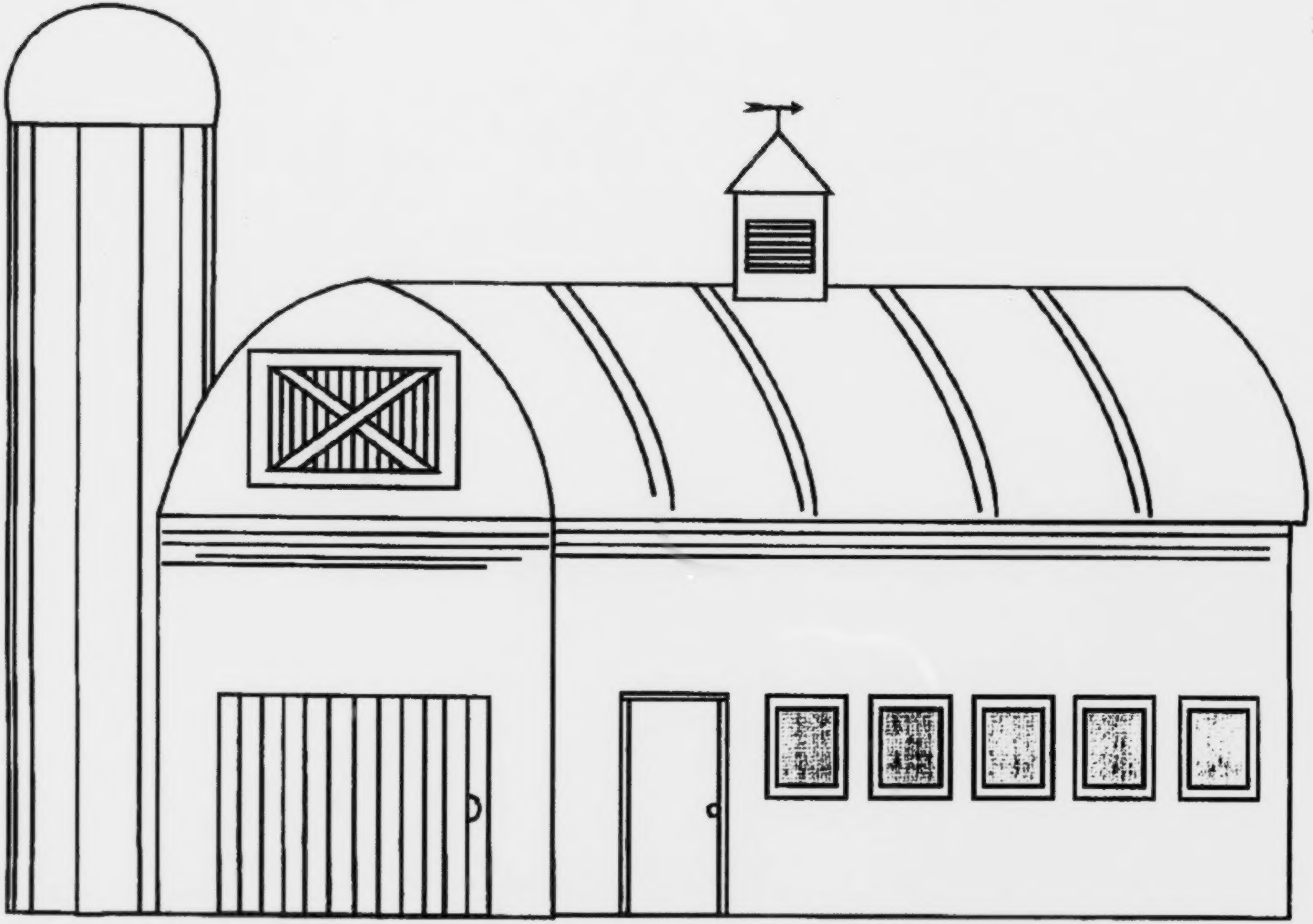
Bulletin Board Display Card

WS- 253


TEXTILE MILL

To be used with:
Baa, Baa, Black Sheep

Bulletin Board Display Card

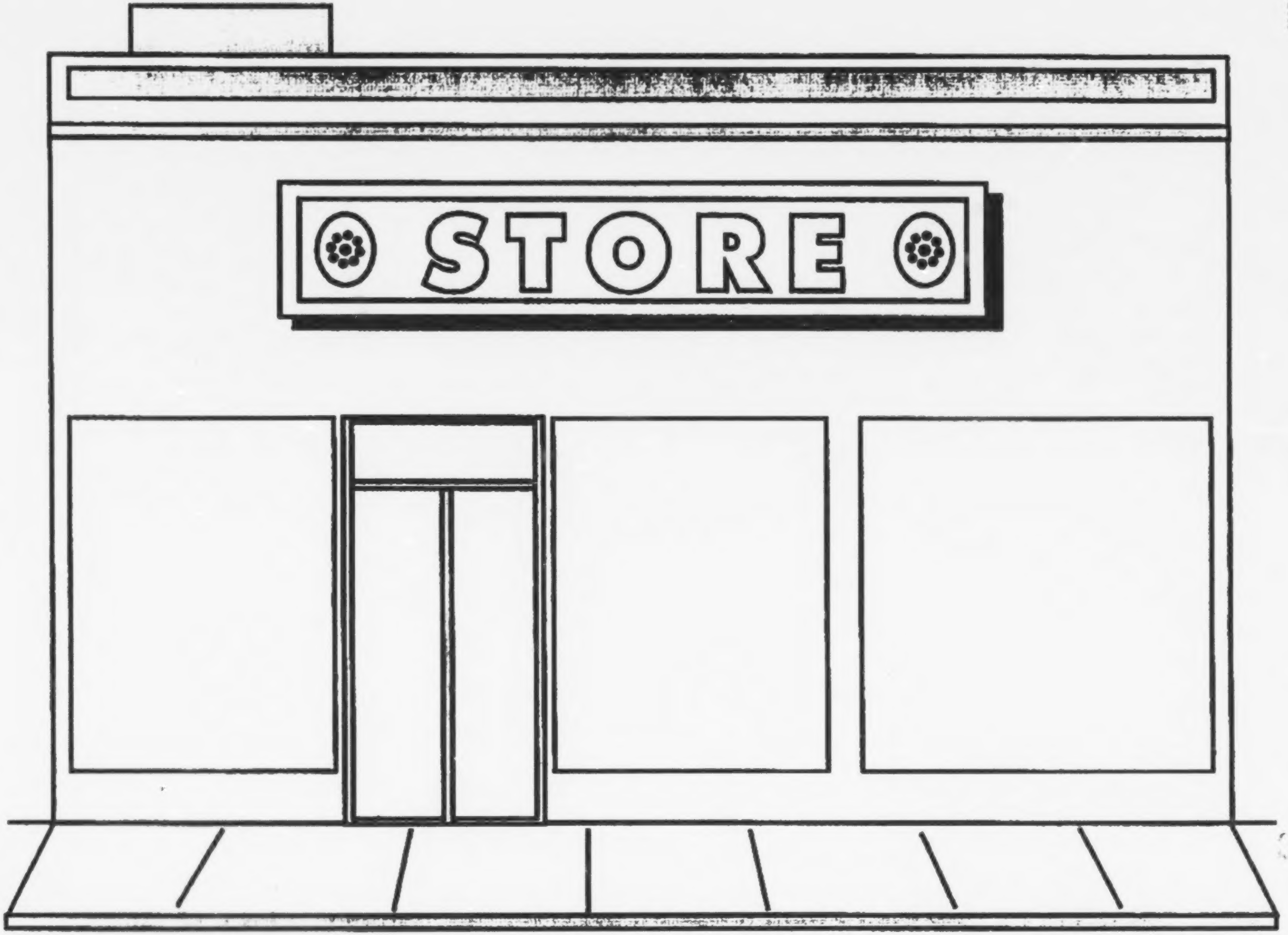


To be used with:
Baa, Baa, Black Sheep

WS- 254

Bulletin Board Display Card

WS- 255



To be used with:
Baa, Baa, Black Sheep

To be used with:
Baa, Baa, Black Sheep

Name ______________________

Wool Information

Facts

1. Wool is the most important animal fiber.

2. Wool is the protective coat (or fleece) from domestic sheep or other animals.

3. There are 450 breeds of sheep that produce different amounts and types of wool.

4. Sheep are raised in flocks. The female is called a ewe and the male is a ram.

5. Wool is composed of a protein called Keratin.

6. Wool is usually yellow or off-white but can be gray, brown, black, or fawn.

7. Wool is nature's miracle fiber because:
   - It's strong and springy.
   - It doesn't soil easily.
   - It insulates and sheds water.
   - It takes dye well and resists fading.
   - Wrinkles disappear quickly.

8. The steps in wool production are:
   - Sheep are sheared.
   - Fleece is graded and sorted.
   - Wool is scoured or cleaned.
   - Wool is carded or disentangled.
   - Wool is spun into yarn.
   - Yarn is woven into fabric.
   - Fabric is manufactured into clothing or household items.

Vocabulary

angora
cashmere
fleece
insulation
mill
scour
textile
wool
carding
domestic
flock
knit
mohair
shear
weave (woven)

9. America's first woolen textile mill was started in 1760.

10. Eighty percent of America's 12 million sheep are raised in 17 western states.

11. Texas, California, Wyoming, Colorado, and South Dakota are the top five sheep producing states.

12. Modern day shepherds use jeeps on ranges. During snowy winters they drop feed from planes or helicopters to the sheep.

Woolen Products

blankets
mittens
upholstery
carpets
rugs
hats
coats
socks
gloves
sweaters

Types of Woolen Fabrics

felt
Saxony
Shetland
flannel
melton
tweed
homespun

Adapted from "It's a Puzzlement," K-6 Classroom Activity Kit by National Farm-City Council, Inc.

WS- 256

To be used with:
Baa, Baa, Black Sheep

Name ______________________________

Wool Production

On the farm or ranch

- Sheep have a four-part stomach like a cow. They eat grass, hay, or silage without chewing. When sheep rest, tiny balls of food called cuds come up from their stomach for more chewing. They spend seven hours chewing their cud.
- Sheep are sheared (wool is harvested) once a year, usually in spring or early summer. An expert can shear a sheep in only five minutes. Two hundred or more sheep can be sheared by one shearer each day. The fleece is removed in one piece. An average fleece weighs 8.5 pounds. It is enough wool for a man's suit.

At the warehouse

- The wool is sorted by type, quality, grade, and yield. It is judged by its fineness or coarseness, length, strength, crimp, and color.

In the mill

- Wool is scoured, or cleaned, to remove dirt and grease. Thirty to seventy percent of its weight is lost. The lanolin, or grease from the hair follicles, is used in cosmetics and hand creams.
- At this point, the wool is sometimes dyed.
  Wool is carded to remove tangles and any remaining dirt. The wool is now a "sliver" (a long, soft untwisted strand of fiber).
- The wool is ready to be spun into yarn. Worsted yarn is for smooth flat cloth. Woolen yarn, which is easier to make, is used for bulkier cloth.
- Fabric is produced by weaving the yarn on looms or by knitting the yarn by interlocking loops.

At the factory

- Fabric is processed into clothing or household goods.

In the store

- Shoppers purchase the finished product.

This sheet may be cut apart and used with the corresponding picture in the bulletin board display.

Adapted from "It's A Puzzlement!," K-6 Classroom Activity Kit by National Farm-City Council, Inc.

From Corn to Plastic

Grade Level: 4-6

Approximate Length of Activity: 30-40 minutes

Objectives:

Teacher:

1. Teach the definition of a renewable resource.
2. Help students recognize the substitution possibilities of a renewable resource for a nonrenewable resource.
3. Explain how corn can be helpful in eliminating unnecessary waste in our landfills.
4. Help students follow the procedures for creating a biodegradable plastic product.

Students:

1. Understand the environmental reason for using corn as a source for the production of plastics.
2. Follow the step-by-step procedures in making plastics from corn.
3. Observe and record data from an experiment.

Illinois Learning Standards: 11.A.2b; 11.A.2e; 12.E.2c

Introduction:

Illinois and Iowa are the two major corn-producing states in the United States. U.S. farmers use more land to grow corn than any other crop, and corn provides more food for people than any other crop. Altogether, about 4000 of the products in a typical supermarket contain some product or by-product of corn.

Corn is one of nature's most amazing energy-storing devices. A corn seed weighs about one-hundredth of an ounce, yet this tiny seed can produce a corn plant that will grow seven to 10 feet tall. The corn plant will produce between 600 and 1000 seeds like the one from which it started. The seeds are known as corn kernels. On an ear of corn, the kernels are arranged in rows. An ear of corn may have as few as eight or as many as 36 rows, but the number of rows is always even. Some of the kernels will become corn seeds that can be planted to grow corn for the next year. Since we can plant new corn every year, it is a renewable resource.

The corn seed (kernel) is composed of four main parts: the pericarp, the endosperm, the germ, and the tip cap. Each of these parts has a role to play in producing a new corn plant. The pericarp is a hard, outer coat that protects the seed both before and after planting. It prevents bacteria and fungi from entering and destroying the seed. The endosperm makes up about four-fifths of the kernel's weight. It provides food energy for the young plant. The germ is the living part of the corn kernel. The germ contains genetic information, vitamins, and minerals that the seed needs to grow. The tip cap is where the kernel was attached to the cob.

In autumn, corn is harvested with combines. Combines are machines that pick, shuck, and shell the ears of corn right in the field. Then the corn is unloaded from the bin on the combine into a truck or wagon with an unloading auger. When the trucks and wagons are filled with corn, the corn is taken to a grain elevator or unloaded into a storage bin. A grain elevator is a cylinder-like structure made out of poured concrete. When a truck or wagon with grain arrives at the elevator, it is weighed. The clerk at the elevator office subtracts the weight of the wagon or truck from the total weight to determine the weight of the corn. The clerk at the elevator also uses a sample to measure the moisture content and weight of the corn. Next, the trucks and wagons go to the elevator storage area. Here the corn is dumped into a pit and then drawn into the elevators with augers in a pipe system.

Over the past several years, many new products have been developed from corn. Here are a few examples:

Cornstarch Packaging Material: Packing peanuts are made with over 95 percent cornstarch. They are used as loose fill in boxes to protect contents. The cornstarch packing peanuts are lightweight, shock absorbing, totally biodegradable, do not attract rodents, and contain no oil. The packing peanuts are made from a renewable resource (corn) and are reusable.

Golf Tees: Tees are made from cornstarch with biodegradable additives and small amounts of inorganic minerals. They are used to hold the golf ball up off the ground. Golf tees made from corn are lightweight, paint free, stronger, reusable, and totally biodegradable. Their usage can replace the use of wooden tees, which helps our environment since trees can take 30 years to grow while corn grows each year. Golf tees made from cornstarch decompose into water, carbon dioxide, and biomass, so golf courses are littered less than with traditional wooden or plastic tees.

Ethanol: Ethanol is a high performance fuel made from corn that is safe for our environment. It burns cleaner and pollutes less than petroleum fuels. Since ethanol is made from a renewable resource (corn), it can be replenished. Using ethanol saves nonrenewable petroleum and reduces our dependence on oil from other countries.

Plastics: Most plastics are made from oil products, a nonrenewable resource. Plastics do not break down or biodegrade. Because of this, plastics last for thousands of years and take up a lot of room in landfills. Landfills are filling up. Many experts feel the landfills in the United States will reach maximum capacity in the next 20 years. One solution to this problem is plastics made from corn products such as cornstarch. Plastics made from corn will break down. Plus, corn is a renewable resource, unlike oil. Plastics from corn will help to reduce space needed for landfills.

Materials Needed:

- "Making Biodegradable Plastic" worksheet
- 2 cups of cornstarch
- 1/4 cup of corn oil
- 2 cups of water (approximately)
- 30 plastic resealable bags
- 2 packages of food coloring (4 bottles/package)
- Tablespoon measures
- Medicine droppers
- Microwave

Activity Outline:

1. Begin with a discussion of plastics. Have students name things they can think of that are made of plastics.
2. Explain how plastics do not biodegrade and are taking up space in landfills.
3. Discuss with students how researchers have found how to make a biodegradable plastic from corn.
4. Using their worksheet, have each student make their own biodegradable plastic.
    a. Place a tablespoon of cornstarch in a plastic resealable bag.
    b. Add two drops of corn oil to the cornstarch.
    c. Add one and one-half tablespoons of water to the corn oil and cornstarch.
    d. Add two drops of your favorite food coloring to the mixture. Seal the bag and knead well to a uniform consistency.
5. Have students complete the questions on their worksheet.

Discussion Questions:

1. Why is it necessary to find other forms of materials instead of depending on oil?
2. What could you make out of the plastic if you let it harden?
3. Discuss additional methods or products.

Related Activities:

1. Illinois Farm Bureau® Ag in the Classroom produces an educational magazine called *Ag Mag*. Issue 11, entitled "The Corn Curl 500," contains activities and information on corn. Contact your county Farm Bureau® to receive free copies for your classroom.
2. Expose your biodegradable plastic to sunlight and air. Compare daily observations to traditional plastic.
3. Bury plastic and biodegradable plastic in the soil. Observe each week and record results.
4. Free samples of "eco foam," a biodegradable packing material, can be obtained from: National Corn Growers Association, 1000 Executive Parkway, Suite 105, St. Louis, MO 63141-6397.
5. Contact your county Farm Bureau® to find out if the Agri-Science kit *Agriculture Renews Our Planet – Growing Energy for the Future* is available for classroom use.

To be used with:
From Corn to Plastic

Name ______________________________

Making Biodegradable Plastic

Follow the recipe to make your own biodegradable plastic from corn and answer the questions below.

Directions:

1. Place a tablespoon of cornstarch in a plastic, resealable bag.
2. Add two drops of corn oil to the cornstarch.
3. Add one and one-half tablespoons of water to the corn oil and cornstarch.
4. Add two drops of your favorite food coloring to the mixture.
5. Seal the bag and knead well to a uniform consistency.

Discussion Questions:

1. What do you notice about your biodegradable plastic?

2. Is your biodegradable plastic the same as the other students? How is it different?

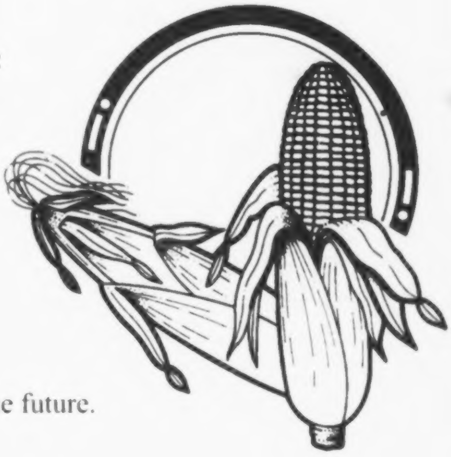
3. What could you make with the biodegradable plastic if you let it harden? (Remember, it will eventually dissolve.)

Heat the plastic in a microwave oven for 20-25 seconds on high power.

1. What happens to your plastic now?

2. Form your plastic into a ball and describe what it will do.

3. Name three things that could be made from corn plastic in the future.



We Want Wheat

Grade Level: 4-6

Approximate Length of Activity: Two hours

Objectives:

Teacher:

1. Introduce information about wheat production.
2. Guide students in a baking activity and teach kitchen safety.
3. Encourage questioning and discovery during a starch test on flour.

Students:

1. Learn about wheat production and the many uses of wheat.
2. Practice baking and kitchen safety skills during a wheat activity.
3. Learn that iodine can be used to test flour for starch.

Illinois Learning Standards: 11.A.2b; 17.B.2a; 17.C.2c; 22.A.2b

Introduction:

Wheat is planted by a drill that is pulled by a tractor. The drill digs tiny furrows that are just deep enough to plant the wheat seed. It drops the seed into the furrows and covers them with soil. After planting, a wheat kernel begins to absorb moisture and swell. The stem starts growing towards the surface of the soil and the primary roots begin growing. A couple of weeks later, the plant starts growing above the ground. Then the stems will elongate and heads will appear. When the wheat flower is pollinated, it will develop into wheat kernels. About 30 to 60 days after flowering is when the wheat kernel becomes ripe. The kernels will increase in size and gradually harden. The entire plant becomes dry and turns golden brown. Depending on the variety of wheat, ripe kernels can be white, yellow, red, or purple.

Farmers will harvest the wheat after it ripens and when the moisture level is no more than 14% of the kernel's weight. Farmers can take samples of their crop to a grain elevator to have the samples tested for moisture. Farmers have to make sure they harvest their wheat crop before weather can damage it.

Wheat can be placed into two groups, winter wheat and spring wheat. Winter wheat grows in milder climates and produces higher yields than spring wheat. Spring wheat, which is grown in extremely cold areas, is planted in the spring and ripens that summer. Winter wheat is planted in the fall and harvested the next spring or summer. The winter wheat plant reaches the stage when tillers form and then as the cold weather (winter) arrives, the plant stops growing. When warm weather returns in the spring, the plant will begin growing again. Most of the wheat grown in Illinois is winter wheat.

Wheat is divided into seven classes based on qualities such as color and texture of the kernels. The seven classes are (1) hard red winter wheat, (2) soft red winter wheat, (3) hard red spring wheat, (4) durum wheat, (5) red durum wheat, (6) white wheat, and (7) mixed wheat.

Millers grind wheat kernels into fine powder to make wheat flour, which contains a protein substance called gluten. Wheat flour is great for baking because the gluten makes the dough elastic. Wheat germ and wheat germ oil are derived from the wheat kernel and used to improve the flavor and nutritional value of foods. Wheat is also used as livestock feed, cosmetics, eating utensils, food thickener, paper, laundry soap, sweetener, insulation, trash bags, and much more.

Starch is a powdery, white substance found in the living cells of green plants. The weeds of wheat, corn, rice, beans, and the stems, roots, and tubers of the potato, arrowroot, and cassava all contain starch. Starch is a carbohydrate, and carbohydrates are very important because they are a source of energy for us. When plants make food through photosynthesis, the plant uses sunlight to change carbon dioxide and water into glucose and oxygen. The glucose can then be converted into starch. To test for the presence of starch in food, chemists use iodine. When starch is present, the iodine will turn a blue-black color.

Materials Needed:

- Iodine
- Flour - whole wheat, all-purpose, or cake
- Small dishes or pans
- Starchy foods - potatoes, cornstarch, sugar, apples
- Non-starchy foods - salt
- 1/2 c. warm water
- Oven
- 2 packages of active dry yeast
- 1/4 c. sugar
- 1/2 t. salt
- 1/2 c. vegetable oil
- 4 to 4 1/2 c. all-purpose or bread flour
- Large bowl
- Large spoon
- Measuring cups and spoons
- Surface for kneading dough
- Greased baking sheets
- Egg white
- 1 T. water
- Oven
- Wire racks for cooling

Activity Outline:

1. Discuss the wheat and starch information from the introduction with your students.
2. Put small amounts of flour in the dishes or pans.
3. Ask the students what they think will happen when iodine is dropped on the flour samples.
4. Put a few drops of iodine on the flour samples and observe what happens. Does the substance contain starch?
5. Perform the same test using the potato, cornstarch, sugar, apple, and salt. Discuss the results.
6. **Throw away the flour samples. The iodine is toxic if ingested in this form!*
7. Make pretzels with your students, using flour as the main ingredient.
    a. Measure a 1/2 cup of warm water into the large bowl.
    b. Sprinkle in yeast and stir until dissolved.
    c. Add sugar, salt, oil, and 3 cups flour. Beat until smooth.
    d. Gradually add remaining flour to make a soft dough.
    e. Knead dough by hand for 10 minutes.
    f. Cover bowl and let rest for 30 minutes.
    g. Divide dough into 24 pieces. Cover bowl and let rest 5 minutes.
    h. Roll each piece into a uniform 18" rope.
    i. Shape each rope into a pretzel by making a circle, overlapping the two ends, twisting them once, and then pressing them onto the bottom curve of the circle. (Dough may also be shaped into 8" breadsticks.
    j. Place on greased baking sheets.
    k. Beat egg white and 1 T. water together. Use the mixture to brush pretzels.
    l. Sprinkle the pretzels with sesame seeds or salt.
    m. Bake in a preheated, 425°F oven for 12-15 minutes or until golden brown.
    n. Remove the pretzels from the baking sheets and cool on wire racks.

Discussion Questions:

1. How is wheat grown?
2. What is wheat used for?
3. What is starch and how can we test for it in foods?

Related Activities:

Primary children's books:

Winter Wheat by Brenda Z. Guiberson
The Little Red Hen and the Ear of Wheat by Mary Finch
Jungle in the Wheat Field by Egon Mathiesen
From Wheat to Pasta by Robert Egan
Wheat by Sylvia A. Johnson
Getting the Main Point: Separating the Wheat from the Chaff by Walter Pauk

Sheep - Earth Friendly Animals

Grade Level: 4-6

Approximate Length of Activity: One hour

Objectives:

Teacher:

1. Lead a discussion about sheep production and how sheep benefit our environment.
2. Teach students about nouns, adjectives, gerunds, similes, and synonyms.
3. Help students use their knowledge of sheep and sentence structure to write sheep poetry.

Students:

1. Develop a poem about sheep using nouns, adjectives, gerunds, similes, and synonyms.
2. Explain why sheep are renewable resources.
3. Learn about the products sheep provide.
4. Describe how sheep help our environment.

Illinois Learning Standards: 3.B.2a; 3.C.2a; 15.A.2a; 17.B.2a; 17.B.2b

Introduction:

The meat from sheep and lamb is a renewable resource. People can continuously produce meat from sheep. Wool is also a renewable resource because wool grows back after shearing. Resources such as coal are not renewable resources because our supply will someday be depleted. It takes many years for coal to form and it will eventually run out because we cannot make more coal. We will not run out of wool because it keeps growing back!

Sheep provide us with many valuable products that we would not want to live without. Besides meat and wool, sheep provide us with medicines, crayons, detergents, tires, ceramics, piano keys, pet foods, ice cream, toothbrushes, buttons, paints, shoe cream, shaving cream, carpet, tennis balls, artist brushes, insulation, baseballs, upholstery, instrument strings, tennis racquet strings, pencils, bandages, marshmallows, tape, and much more!

Sheep grazing (eating on land) provides many benefits for our environment. Here are a few:

- Sheep eat weeds and plants around small trees in newly planted forests. This helps new trees in the forest receive more sunlight, minerals, and water. It also saves money because fewer chemicals are used. (In California's Tahoe National Forest, sheep are used to promote tree growth in burned areas.)

- Sheep are able to safely eat noxious weeds that are toxic to other animals. These noxious weeds kill surrounding vegetation and trigger soil erosion. When sheep eat these weeds, other animals eat plants that are not toxic to them. (Sheep are used in northern states to control Leafy Spurge, a noxious weed. Sheep thrive on it while it is toxic to other animals.)
- Sheep are used as firefighters! They eat woody plants, broadleaf plants, tall weeds, and grasses. When sheep eat these things, there is less undergrowth. Less undergrowth means that fires can be easier to control because there is less fuel for the fire. This also reduces the cost of herbicides to kill the undergrowth. (In California's Angeles National Forest, 6000 sheep are used to keep firebreaks free of brush.)
- Sheep are used for wildlife enhancement. When sheep graze in the summer on plants that are dried and low in food value, the plants grow back higher in food value. Other animals (elk, deer, antelope, and birds) are then able to have higher protein vegetation in the winter. This causes many animals to be healthier and increase populations.
- The pointed hooves of sheep break up soil so seeds can find a place to grow. This also helps water seep into the ground and prevents erosion as new plants grow.
- Wool from sheep can be used to clean up oil spills.
- Sheep are used to control mice in apple orchards. Mice chew on apple tree bark. When sheep are put in the orchard, they eat the grasses that mice hide in. They also clean up fallen apples and fertilize the ground.

Materials Needed:

- *Hooray for Sheep Farming* by Bobbie Kalman
- Index cards: 1 blue, 2 yellow, 3 pink, 1 purple, and 1 orange for each student
- Bulletin board
- Markers, pens, or pencils

Activity Outline:

1. Read *Hooray for Sheep Farming* by Bobbie Kalman. Discuss the book and the above information about sheep with the students.
2. Explain to the students that they are going to write poems about sheep using the information they learned.
3. Tell the students that their poems must follow this format:

   1 noun
   2 adjectives
   3 gerunds (-ing words)
   1 simile (like…as…)
   1 synonym to the noun, or the noun repeated
4. Give the students a sample poem:

   Sheep
   Nutritious, Valuable
   Grazing, Producing, Clothing
   Like a cow's stomach
   Sheep

5. Give each student 1 blue index card, 2 yellow cards, 3 pink cards, 1 purple card, and 1 orange card.
6. Ask the students to write one noun that relates to sheep on their blue cards and share what they wrote. Tack all of the blue cards in a cluster on the bulletin board. Ask the students to write one adjective on each of their yellow cards, share their adjectives, and tack them in a cluster on the bulletin board. Repeat this process with the gerunds, similes, and synonyms to create a sheep word bank.
7. Tell the students to use the words on the bulletin board to create poems about the value and characteristics of sheep. Read the poems aloud and post them on the bulletin board.

Discussion Questions:

1. What products come from sheep?
2. Why are sheep a renewable resource?
3. What are some nonrenewable resources?
4. How do sheep help our environment?
5. What is a noun, adjective, gerund, simile, and synonym?

Related Activities:

1. Use the instructions in Illinois Farm Bureau's® *Ag Mag* 14 "Simply Sheepish" to spin wool with a drop spindle. To obtain copies, please see Other Resources.
2. Look at the market prices for sheep in an agricultural publication (such as the Illinois Farm Bureau® *FarmWeek*) or on the Internet. Cover prices over time and graph the results.
3. Research sheep by-products. Identify the parts of the sheep that each by-product comes from.
4. Dissolve one or more packages of colored drink mix into a gallon jar with boiling water. Place white wool into the jar. After an hour, the wool will have absorbed all of the dye and the water will be clear! (Blue colored drink mix works the best.)

Other Resources:

1. "Simply Sheepish," *Ag Mag* 14 from Illinois Farm Bureau® — This colorful issue talks about selling sheep, shearing sheep, spinning wool, lamb, and careers with the sheep industry. Contact your county Farm Bureau® to receive free copies for your classroom.
2. *Sheep Booklet* with facts & activities and *Spinning Kit* are available from Ag Experience, 3144 N. G Street #125-141, Merced, CA 95340, (209) 358-9057. The *Spinning Kit* includes combed corded wool, two doweling drop spindles, lesson plan, and labeled wool samples. Cost is $12 for each.
3. *Wool Fiber in the Making* from Pendleton Woolen Mills. This chart has actual samples of wool at various stages of production. Available free to educators. Call 1-800-760-4844 or visit their web site at http://www.pendleton-usa.com.

Rainforest Craze

Grade Level: 4-6

Approximate Length of Activity: Two hours

Objectives:

Teacher:

1. Help students understand the importance of trees in our environment and as renewable resources.
2. Assist students in using their knowledge of rainforests to create an attractive bulletin board.
3. Help students understand the locations of rainforests in the world.
4. Help students distinguish the different layers of a rainforest.

Students:

1. Explain why trees are renewable resources and name some products that come from trees.
2. Understand the different layers of a rainforest.
3. Construct a bulletin board to represent the layers of a rain forest.

Illinois Learning Standards: 12.A.2a; 12.B.2a; 12.B.2b; 17.A.2b; 26.B.2d; 27.B.2

Introduction:

Rainforests were originally named for forests that grow in constantly wet conditions. Now they are considered forests that are located in areas which receive more than eighty inches of rain per year. Rainforests grow in over fifty countries. Although we often think of the tropical rainforests along the equator, there are other types of rainforests. Located along the salty coastlines of the Southeast Asian Islands are flooded mangrove forests, in South America there are high altitude cloud forests, and in the U.S. Pacific Northwest there are temperate rain-forests.

Rainforests have four levels.

- The *emergent level* includes trees between 115 feet and 250 feet above the ground. The trees in the emergent level have small leaves, umbrella-shaped crowns, and tall slender trunks. Emergent level trees receive the greatest amount of sunlight available. At this height above ground there are high temperatures, low humidity, and strong winds.
- The *canopy level* is under the emergent level. Canopy trees are very tight and densely covered with other plants and vines. Ninety percent of the organisms of the rainforest can be found in this level.
- The *understory level* is beneath the canopy level. These trees and shrubs are shorter than fifteen feet and they only receive two to 15 percent of the sunlight that falls on the canopy. The understory level is dark due to the dense canopy level. Many young trees and leafy plants grow here because they can tolerate low light.
- The *herb layer* is on the forest floor. On the forest floor, the air is still, the temperature is constant, and the humidity is almost always above 70 percent. There is not much vegetation on the forest floor because very little light can reach it. The thin layer of vegetation includes fallen leaves, seeds, fruits, and branches.

Trees, such as those in rainforests, help our environment in many ways. Trees act as windbreaks and keep the wind from blowing the topsoil away. The roots of trees help prevent soil from being washed away during heavy rains because the roots and root hairs hold the soil in place. Trees also help make soil. The leaves add organic matter to the soil and the roots break soil and rocks down into smaller pieces. Trees in various types of forests provide a sheltered environment for animals.

Trees also add water to the air. Not all of the water trees absorb is used to make food for the tree. Most of the water is lost through transpiration, which puts water back into the air. This added moisture to the air helps to make rain.

Materials Needed:

- Construction paper
- Large world map
- Crayons or markers

Activity Outline:

1. Discuss how trees help our environment and then discuss what rainforests are.
2. Teach the students about the different layers in a rainforest. Additional information about rainforests can be found in the encyclopedia under "tropical rainforests."
3. Have the students create a bulletin board rainforest. Divide the class into four groups. Assign one group the emergent level, another group the canopy level, another the understory level, and the last group the herb layer.

4. The emergent level group should make tall trees like the ones found in the emergent level. The canopy level group should make trees close together that have vines and other plants around them. The understory level group should make short trees and shrubs. The herb layer group should draw the forest floor that has fallen leaves, seeds, fruits, and branches lying on it. Make sure the group leaves some room for the trunks of the other trees and shrubs on the forest floor.
5. The students may also want to research what types of animals are found in rainforests and add them to their display.

Discussion Questions:

1. Why are trees renewable resources?
2. Name five products of trees.
3. Where are rainforests found?
4. Name the layers of rainforests.
5. Name the different types of rainforests.

Related Activities:

1. Many products we use everyday are made from trees: Vinegar, coffee filters, pancake mix, maple syrup, parmesan cheese, pet food, hot chocolate mix, apple cider, jams, jellies, antacids, aspirin, brushes, candlesticks, carpeting, chairs, clocks, clothing, combs, fireplaces, furniture, hair spray, hooks, linoleum floor, liquid soap, makeup, nail polish, paint, paint thinner, paper plates and cups, rayon curtains, shampoo and conditioner, tables, tea bags, toilet paper, toothpaste, towel racks, wall paper, wax polish, car bumpers, eyeglass frames, tires, football helmets, guitars, toys, photographs, pianos, and plaques. Discuss what life would be like without trees.
2. "Oxygen Givers:"
    a. Materials needed: Clear plastic cups, non-sealable plastic bags, leafy twigs from a tree branch, and clear tape.
    b. Have each student (or group) fill two cups three-fourths full of water.
    c. Remove the leaves from *one twig*.
    d. Place a plastic bag over each twig and tape tightly.
    e. Place each twig in a cup of water.
    f. Place the cups in the sunlight for a couple of days.
    g. After a couple of days, discuss with the class what has happened. How do leaves give us oxygen and water?

Other Resources:

1. Books:
   Conserving Rain Forests by Martin Banks (Steck-Vaughn, 1989).
   Journey Through a Tropical Jungle by Adrian Forsyth (Simon and Schuster, 1988).
   Nature's Green Umbrella: Tropical Rain Forests by Gail Gibbons (Morrow, 1994).
   The Rain Forests by Billy Goodman (Tern, 1991).
2. Web site:
   Animals of Peru's "Manu" Rain Forest: http://www.pbs.org/edens/manu/flora.htm

Be Aware of Grain

Grade Level: 4-6

Approximate Length of Activity: 30 minutes

Objectives:

Teacher:

1. Teach students about farm safety.
2. Clearly explain the hazards of grain on a farm and how accidents can be prevented.

Students:

1. Learn about the hazards of grain on a farm and explain why accidents happen.
2. Create a farm safety rap song after learning about farm safety and seeing a sample song.

Illinois Learning Standards: 1.B.2d; 2.A.2a; 3.B.2a; 3.B.2b; 3.C.2a; 19.C.2a; 22.A.2c

Introduction:

When grains such as corn, soybeans, and oats are harvested, they are emptied into wagons, trucks, and storage bins. The grain moves from a large area into a small opening so a funnel is created by gravity. This funnel can pull people into the grain and cause them to suffocate, or die from lack of oxygen. It only takes two to four seconds to become helpless in a flow of grain. In 10 seconds, a person can be completely covered. Never play around grain equipment and never go in a grain wagon, truck, or bin while grain is unloading.

Grain suffocation can also happen in grain bins where the grain is stored. Sometimes a crust, or bridge, forms over the grain and people think it is safe to walk on. Actually, there is an open pocket underneath the crust that is not filled with grain. When a person steps on the crust, they can fall through, be covered by grain, and suffocate. Even adults do not have the strength to pull themselves out of grain before they are covered.

Materials Needed:

- "Farm Safety Rap Song" worksheet
- Large sheet of paper/dry erase board/chalkboard
- Markers/chalk/crayons

Activity Outline:

1. Talk to your class about farm safety. You may want to show them the pictures of farm machinery that are included or purchase a farm safety video. Ask them why accidents happen on farms.
2. The farm safety rap song was written by fifth graders from an Allison-Bristow school in Iowa. They were able to perform it for Barbara Bush when she visited Iowa as the First Lady! Print copies of the rap song for your students.
3. Ask the students to underline the rhyming words using various colors of markers or crayons.
4. Let the class make up their own farm safety rap. Write it on paper, a dry erase board, or the chalkboard.

Discussion Questions:

1. How can grain suffocation be prevented?
2. Why do people get trapped in grain while it is being unloaded?
3. Why do people get trapped in grain while it is being stored?
4. How do the demonstrations below relate to farm safety and how do they work?
5. Name a sample set of rhyming words.

Related Activities:

1. Try this demonstration to show the students what it is like to be trapped in grain while it is emptied.
    a. Cut the bottom off a plastic gallon milk jug.
    b. Turn the jug upside down and fill it with grain while the cap is on.
    c. Place a small toy figure on top of the grain and place a container under the cup.
    d. Remove the cap. As the grain quickly flows out of the jug, it will pull the toy figure along with it.
2. Try this demonstration to show the students what it is like to fall into grain that has a pocket of air under it.
    a. Inflate a balloon and place it at the bottom of a five-gallon bucket.
    b. Fill the bucket with grain and place a toy figure on top of the grain.
    c. Pop the balloon with a needle attached to a stick. As the balloon pops, the person will sink into the grain.
3. Try this demonstration to show students how heavy grain is and how hard it is to pull out when you are being submerged deeper and deeper.
    a. Attach a rope to a wooden disk.
    b. Place the wooden disk in a 30-gallon trash container and fill the trash container with grain.
    c. Ask the students to pull the disk out. The weight of the grain is more than most kids can pull.

Other Resources:

1. "Tug of War with Grain" - A grain safety curriculum which uses flowing grain to explain force, resistance, pressure, velocity, and friction. (Junior High and High School).
2. Farm Safety 4 Just Kids—an organization which provides written materials, decals, and videos about farm safety. 110 S. Chestnut Ave., P. O. Box 458, Earlham, IA 50072, (515)758-2827, www.fs4jk.org.
3. Resource Units, TASK-Teaching Agricultural Safety to Kids, 221 North 48th, Quincy, IL 62301, 1-800-323-8275.
4. "Farm Safety, Family Style" Video, DowElanco, P. O. Box 5166, Cedar Rapids, IA 52406-5166.
5. "Safety Net" Video, "Farm Safety, A Second Chance" Video, and "Farm Safety for Kids" Video, Farm Safety 4 Just Kids, P. O. Box 458, Earlham, IA 60072, 1-800-423-5437.

Name_______________________

Farm Safety Rap Song

The following rap song was written by fifth graders from Allison-Bristow school in Iowa. They were able to perform it for Barbara Bush when she visited Iowa as the First Lady.

**Let me tell you about a story of a man and his grain.
Stepped in the bin, corn fell around him like rain.
It was a mistake, but it ain't no sin,
suffocation in the grain bin.
Tractor on the shoulder late at night.
Loaded grain wagons; it was quite a sight.
No use trying to keep it on the shoulder,
another farm vehicle tipped over.
This is a rap of farm safety for kids.
Listen up, you may learn something you never did.
If you don't stay alert,
Someone could really get hurt.**

Find the rhyming words in the farm safety rap song above and underline them with matching colors. Write your own rap song using rhyming words (such as these below) and what you've learned about farm safety. Some words you might use are:

care
look
warning
alert
watchfulness
caution
mind
advice
safety
notice
wariness
heed
observe

Growing Cotton

Grade Level: 4-6

Approximate Length of Activity: One to two class periods

Objectives:

Teacher:

1. Help students understand the production, processing, and marketing of cotton.
2. Teach students that cotton is a valuable resource.

Students:

1. Learn about the history, growth, and production of cotton.
2. Discuss the importance of cotton products to our world and the economics of its production.

Illinois Learning Standards: 12.A.2a; 12.B.2a; 13.B.2b; 13.B.2c; 13.B.2e; 15.A.2a; 17.C.2a; 17.C.2c; 26.A.2f

Introduction:

Cotton Has Been Around A Long Time - No one knows the exact age of cotton. Scientists searching caves in Mexico found bits of cotton bolls and pieces of cotton cloth that proved to be at least 7000 years old. When Columbus discovered America in 1492, he found cotton growing in the Bahaman Islands. By 1500, cotton was known throughout the world.

Cotton is an Important Crop - Today, the world uses more cotton than any other fiber and it is a leading cash crop in the U.S. In 1997, the U.S. produced 18,793,000 bales of cotton. Cotton has hundreds of uses, from blue jeans to shoe strings. One bale of cotton can produce 21,960 women's handkerchiefs, 4321 mid-calf socks, 1217 T-shirts, 3085 diapers, 1256 pillow cases, or 690 terry bath towels. All parts of the cotton plant are useful. The most important is the fiber or lint, which is used in making cotton cloth. Plastics, explosives, and other products are made from cellulose which is provided by the linters—the short fuzz on the seed. Cotton is also used as a reinforcement material in bicycle tires, and cotton fibers are used in money and legal documents to make the paper stronger.

Cotton Growing Climate - Cotton grows in warm climates. In this country the 12 major cotton-producing states are Alabama, Arizona, Arkansas, California, Georgia, Louisiana, Mississippi, Missouri, New Mexico, North Carolina, Tennessee, and Texas. Some cotton is also produced in Florida, Kansas, and Virginia. Cotton yield in the U.S. averages approximately one and one-third bales per acre with a weight of about 500 pounds per bale, or 666 pounds of cotton per acre. This yield is about twice as much as in 1950 and is due to better land use, improved plant varieties, mechanization, fertilization, and irrigation. It also is a result of much better control of disease, weeds, and insects.

Growing Cotton - Farmers in south Texas plant cotton as early as February, but in more northern parts of the Cotton Belt, they plant as late as June. Seeding is done with a machine called a planter that covers as many as 10 to 12 rows at a time. Machines called cultivators uproot weeds and grass that compete with the cotton plant for soil, nutrients, sunlight, and water. After the plant blossoms, the blooms wither and fall, leaving green pods called cotton bolls. Inside the boll, moist fibers grow and push out from the newly formed seeds. The fibers continue to expand under the warm sun. Finally, the fibers split the boll apart and the fluffy cotton bursts forth. The crop is harvested by machines.

Processing the Cottonseed - The cottonseed is crushed in order to separate its three products—oil, meal, and hulls. Cottonseed oil is used primarily for shortening, cooking oil, and salad dressing. The meal and hulls are used in livestock, poultry, and fish feed as well as fertilizer. The stalks and leaves of the cotton plant are plowed under to enrich the soil.

Processing Cotton - In 1793, Eli Whitney invented the cotton gin. This machine separates the cotton fibers from the seed. This was a major improvement in cotton production because before that time, the fibers and seed were separated by hand. An experienced worker could pick about 450 pounds of cotton per day, but this cotton still had the seeds inside. In 1850, a mechanical picker that pulled cotton from the cotton boll was first patented. In the 1930s, after experimentation and improvements, a mechanical cotton picker was used to pick 8000 pounds of cotton in one day.

Today, after machines pick cotton and separate the fiber from the seed, the cotton is baled and sent off to the textile mill where the fibers are cleaned and straightened. The fibers are formed into an untwisted rope, processed further, and wound onto bobbins as cotton yarn. Machines called looms weave cotton yarns into fabrics which are bleached, pre-shrunk, dyed, printed, and given a special finish before being made into clothing or products for the home.

Colored Cotton - A New Development - The breeding and production of cotton with naturally colored lint is a recent development in the cotton industry. Varieties of cotton have been bred so their lint color are shades of green, blue, and brown. With colored cotton the amount of fiber processing in the manufacturing of a finished color product decreases. The costly process of chemical dying is eliminated since the cotton will already have color. Cottons that are naturally colored maintain their color through many washings and fade little over time.

Materials Needed:

- "Connecting to Agriculture" video (Contact your county Farm Bureau.®)
- Cotton Bolls (See Other Resources)
- Small scale
- Cotton garment
- Square of cotton material with unhemmed edges
- Microscope

Activity Outline:

1. Show students the 16 minute video, "Connecting to Agriculture," which is available on loan from your county Farm Bureau®.
2. Discuss cotton and the economics of the product. Where is it grown? How much is grown? What do the producers do with the cotton? How is cotton processed? Where are cotton products sold?
3. Tell students about the mechanical improvements in the cotton industry such as the cotton gin and the mechanical cotton picker. How did these inventions help the economics of cotton production? Can the students think of other mechanical improvements in the cotton industry? (spinning jenny, cotton mill machinery, irrigation systems, planters, cultivators, etc.)
4. Hold a "Hand-Ginning" contest in the class. Give the students seven minutes to separate the seed and fiber from a given amount of cotton. (See Other Resources to obtain cotton for your classroom.) When seven minutes are up, count the seeds and weigh the fiber that each student separated. How efficient is hand ginning? Ask the students if they understand why there was a need for the cotton gin.
5. Talk with the students about cotton weaving. After the cotton is spun into yarn, it is woven to create material. The yarns used for material are called warp or weft yarns. Warp yarns are those that run lengthwise and weft yarns run crosswise. With technology, cotton mills are able to produce up to 100 yards of material an hour per loom.
6. Show your students a garment made from cotton. Point out the warp and weft yarns.
7. Show your students a square of unhemmed cotton material. Pull individual threads away from the sides of the square and study the weaving of the cloth. The weft threads will be a different color than the warp threads. Look at the edge of the cloth under a microscope and examine the thread directions.

Discussion Questions:

1. Why is cotton an important crop?
2. Why is cotton a leading cash crop?
3. What are some products made from cotton?
4. How is cotton grown?
5. Why was the cotton gin important?
6. Why was the mechanical cotton picker important?

Related Activities:

Try this activity to demonstrate the weaving process of cotton on a loom:

a. Find a square, scrap piece of wood to use as a loom.
b. Place an even number of nails along all four sides, evenly spaced.
c. Wrap knitting yarn back and forth along the top and bottom nails. These are the warp yarns, or lengthwise yarns.
d. Weave another length of yarn over and under the existing yarn. These are the weft yarns, or crosswise yarns.
e. Try other patterns with the weft yarn such as diagonal or crossing over several yarns.

Other Resources:

1. *Cotton Kit* or *Primary Cotton Kit*, Ag Experience, 3144 N. G Street, Merced, CA 95340, (209) 358-9057.
2. *Cotton Now and Then* by Karen Willing & Julie Dock, Ag Experience, 3144 N. G Street, Merced, CA 95340, (209) 358-9057.
3. *Story of Cotton* kits and videos, National Cotton Council, ATTN: Communication Services Dept., Box 12285, Memphis, TN 38182.
4. *Cotton's Journey From Seed to You: A Field Trip in a Box*, The Alaca Company, P.O. Box 55, Tranquillity, California 93668, (209) 698-5190.

The Many Hats of Agriculture

Grade Level: 4-6

Approximate Length of Activity: 45-60 minutes

Objectives:

Teacher:

1. Make students aware of the many different types of agriculture-related careers available.
2. Help students understand that farming is a multi-faceted occupation requiring many job skills.

Students:

1. Name jobs/careers related to agriculture.
2. Explain why farming is just one career in the agricultural industry.
3. Recognize the many job skills farmers need.

Illinois Learning Standards: 15.A.2a; 25.B.2

Introduction:

You don't have to come from a farm to pursue a position in agriculture. There are ag-related jobs everywhere for anyone! In fact, one out of every six jobs in the United States is related to agriculture. With over 250 career areas available in the field of agriculture the possibilities are numerous. Plus, there is a demand for qualified people to fill these positions. According to the United States Department of Agriculture, more than 57,000 jobs open each year in agriculture.

More than 22 million people have careers in agriculture. Only two million of them are traditional farmers, but many are involved in the farm to market process. There are agriculture careers in agribusiness, communications, engineering, biotechnology research, government, education, computer science, processing, distribution, marketing, and many other areas. Some people have careers connected to agriculture, and do not realize it! For example, sales representatives for food distributors, genetic researchers, and elementary teachers who teach topics such as plant and animal systems are all involved in agriculture because their jobs relate to the food and fiber system. The agricultural industry is made up of six employment areas.

These areas are:

Production Specialists - 7%
Social Service Professionals - 9%
Education and Communication - 11%
Managers and Financial Specialists - 13%
Scientists, Engineers, and Related Specialists - 32%
Marketing, Merchandising, and Representatives - 28%

Agricultural Production Specialists include careers such as aquaculturalist, turf producer, viticulturist, rancher, farm manager, grain and/or livestock farmer, wildlife manager, greenhouse manager, fruit and vegetable grower, and specialty animal producer.

Social Service Professionals include careers such as career counselor, youth program director, dietitian, regulatory agent, community development specialist, regional planner, park manager, food inspector, and outdoor recreation specialist.

Communication and Education Specialists include careers such as computer systems analyst, illustrator, journalist, information specialist, personnel development specialist, agriculture/horticultural teacher, public relations representative, computer software designer, and radio/television broadcaster.

Managers and Financial Specialists include careers such as accountant, policy analyst, banker, food service manager, retail manager, consultant, wholesale manager, economist, insurance agency manager, and association manager.

Scientists, Engineers, and Related Specialists include careers such as agronomist, remote sensing specialist, research technician, environmental scientist, landscape architect, food scientist, animal scientist, agricultural engineer, water quality specialist, and plant scientist.

Marketing, Merchandising, and Sales Representatives include careers such as grain merchandiser, insurance agent, sales representative, landscape contractor, restaurant manager, market analyst, commodity broker, export sales manager, advertising manager, and forest products merchandiser.

Materials Needed:

- "Careers In Agriculture" worksheet
- "How Many Hats Does A Farmer Wear? Part A"
- "How Many Hats Does A Farmer Wear? Part B"
- Brads (brass fastener – one per student)
- Scissors (one per student)
- Dictionaries (optional)

Activity Outline:

1. Discuss the information from the introduction. Make sure the students understand what agriculture is and what types of careers are involved in agriculture.
2. Pass out the "Careers in Agriculture" worksheet. There are nine different agriculture careers described in this activity. Students must match the description to the career. As an option you may provide dictionaries to the students if they are having difficulty.
3. Next, pass out Part A and Part B of "How Many Hats Does A Farmer Wear?" Have each student cut out the three circles. Place the farmer circle on top of the circle with the careers. Then place these two circles on top of the circle with the career descriptions. Fasten the three circles together in the center with a brad.
4. Ask the students to find a hat on the middle circle and put it on the farmer's head. Then try to find the job description that fits best with what the farmer does when wearing that hat.

Discussion Questions:

1. Is agriculture more than just farming?
2. What are some agricultural careers other than farming?
3. What does a horticulturist do? An agriculture communication specialist? A veterinarian?
4. How many different jobs does a farmer need to understand and be able to perform?
5. Do any of these careers interest you?

Related Activities:

1. Agricultural Charades: List agricultural careers found in your community on slips of paper. Have students take turns acting out the career on the paper drawn from a hat. The other students try to guess what career is being portrayed. Older students might suggest the careers for the hat themselves by writing or drawing ideas.
2. Local Agricultural Careers: Bring several telephone books to class. Have the students use the Yellow Pages to find careers related to agriculture. You might see how many ag careers they can list in ten minutes, then ask several students to write their lists on the chalkboard. Now, who can find a career not related to agriculture in any way?
3. My Ag Roots: How many of the students have parents or other family members in agricultural careers? After discussing those jobs, ask the other students about their families' careers. Some of those are probably in agriculture too, even though the students didn't realize it. Have students make a family tree with the help of their parents, and state what career each family member has.
4. Contact your local county Farm Bureau® to arrange for a guest speaker or several guest speakers to talk about their agricultural occupations.
5. Have students research and interview people in a particular job. Then prepare oral reports about the job they researched.

To be used with:
The Many Hats of Agriculture

Name ____________________________

Careers In Agriculture

Match each of the job descriptions with the proper career.

_____ 1. Works with farmers to reduce the amount of soil erosion on their land. Has a thorough knowledge of soils and how they function, understands the contour of the land and how to work with it, and knows how to manage rain water and install grass waterways and drainage tile.

_____ 2. Cares for animals when they are sick. Sometimes "specializes" in one type of animal and helps farmers maintain healthy livestock by providing customized health care and feeding programs.

_____ 3. Protects the health of the consumer. He/she sees that meat is produced, processed, and packaged in a safe way which meets all safety and cleanliness guidelines.

_____ 4. Studies "bugs." Insects can damage crop plants, carry disease, and make people sick. Some insects are actually helpful because they eat other bugs or pollinate plants.

_____ 5. Has knowledge about crop production. He/she is an expert in seedling growth, tillage, planting, weed control, fertilization, harvesting, storage of grain, and staying current on any advances.

_____ 6. Designs equipment for the farmer. This person knows about the working of tractors, combines, planters, storage buildings, augers, grain dryers, grain drills and more, and how to design them better.

_____ 7. Involved in growing various plants. This job includes growing and selling trees, shrubs, flowers, vegetable plants, and helping people landscape the area around their house or a building.

_____ 8. Teaches high school students about agriculture and ag-related careers. He/she may also teach adult education classes that help local farmers or serve as an advisor for an FFA chapter.

_____ 9. Knowledge about agriculture in general and being good in communication is part of this job. This person writes for television, radio, newspapers or magazines, and their audience may be the farmer or consumer.

A. Entomologist
B. Meat inspector
C. Agriculture Communication
D. Horticulturist
E. Veterinarian
F. Agronomist
G. Soil Conservationist
H. Agricultural Engineer
I. Vocational Agricultural Instructor

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To be used with:
The Many Hats of Agriculture

Answer Key

Careers In Agriculture

Match each of the job descriptions with the proper career.

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A 4. Studies "bugs." Insects can damage crop plants, carry disease, and make people sick. Some insects are actually helpful because they eat other bugs or pollinate plants.

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A. Entomologist
B. Meat inspector
C. Agriculture Communication
D. Horticulturist
E. Veterinarian
F. Agronomist
G. Soil Conservationist
H. Agricultural Engineer
I. Vocational Agricultural Instructor

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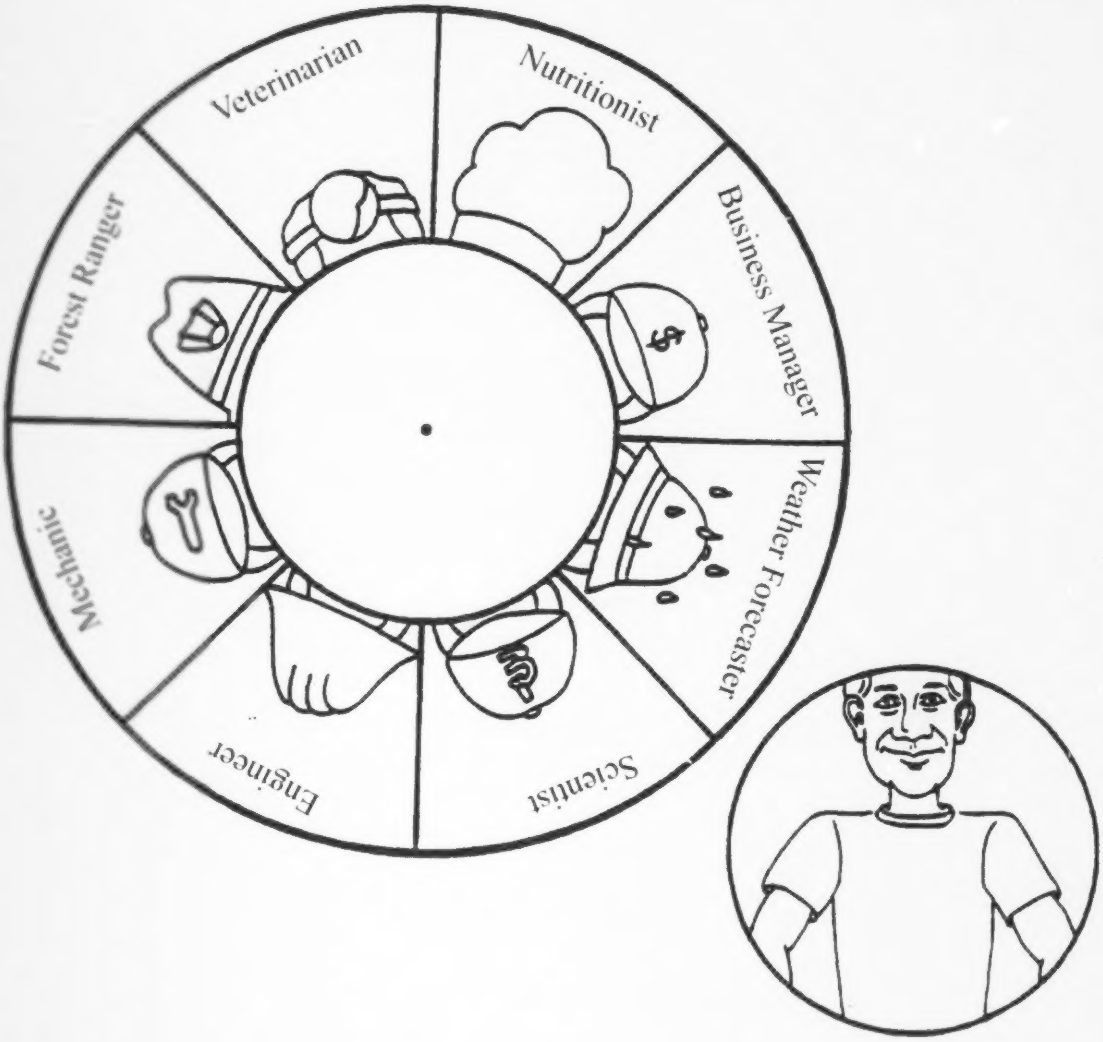
How Many Hats Does a Farmer Wear?


Veterinarian
Nutritionist
Business Manager
Weather Forecaster
Scientist
Engineer
Mechanic
Forest Ranger

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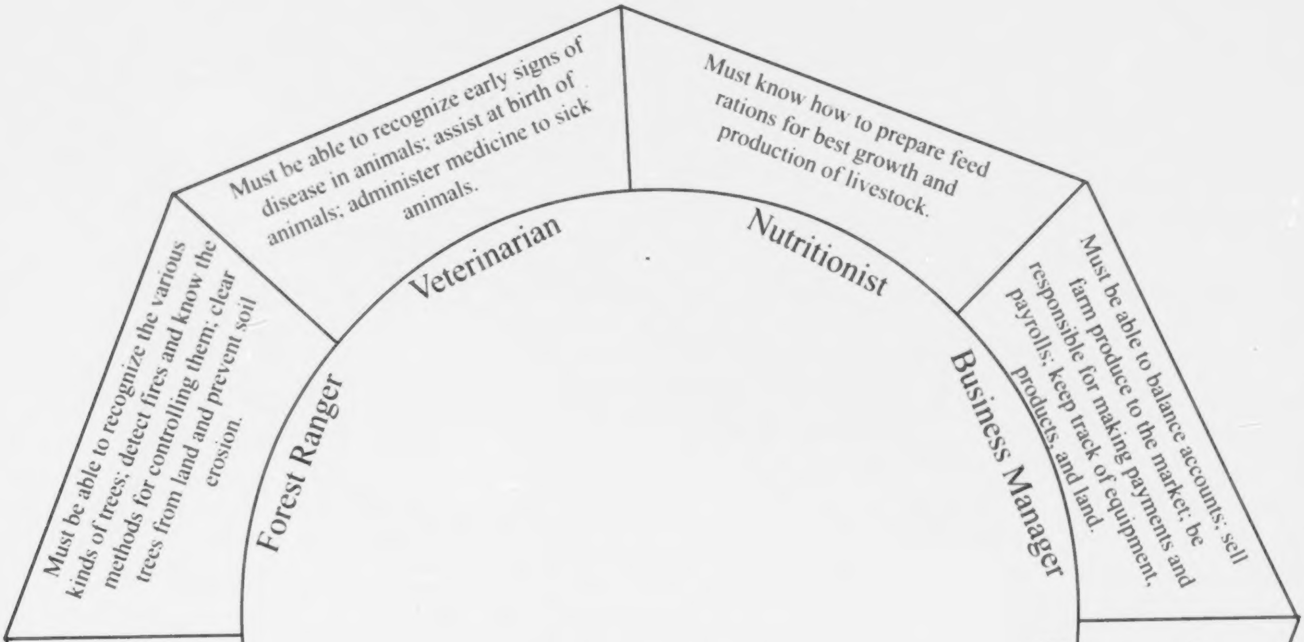
To be used with:
The Many Hats of Agriculture **Part B**

How Many Hats Does a Farmer Wear?



Veterinarian

Must be able to recognize early signs of disease in animals; assist at birth of animals; administer medicine to sick animals.

Nutritionist

Must know how to prepare feed rations for best growth and production of livestock.

Business Manager

Must be able to balance accounts; sell farm produce to the market; be responsible for making payments and payrolls; keep track of equipment, products, and land.

Weather Forecaster

Must understand weather and climate; be aware of possible weather changes and how to prepare for these changes.

Scientist

Must understand soil composition and determine the best fertilizer and seed for largest production; the effect of chemicals on animal and plant life.

Engineer

Must know how to plan and construct fences and buildings; build irrigation ditches and control the flow of water; use natural resources to grow products useful to man.

Mechanic

Must be able to operate and maintain both simple and complicated machinery; make repairs and keep machines in good working order.

Forest Ranger

Must be able to recognize the various kinds of trees; detect fires and know the methods for controlling them; clear trees from land and prevent soil erosion.

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Making Corn Husk Dolls

Grade Level: 4-6

Approximate Length of Activity: Two to three class periods

Objectives:

Teacher:

1. Explain the history of corn.
2. Use corn husks to present a lesson on how to make corn husk dolls.

Students:

1. Become aware of the history of corn and its importance.
2. Use corn husks to create a corn husk doll.

Illinois Learning Standards: 17.B.2a; 18.A.2; 26.B.2d; 27.B.2

Introduction:

The history of corn began in Central America over 7000 years ago. Corn is a member of the grass family of plants. The Mayan, Aztec, and Inca Indians of Central and South America learned to use almost every part of the corn plant. The leaves contain a large amount of sugar and the Indians used them as the first "chewing gum." Immature corn was eaten as a fresh vegetable. The dry, mature kernels of corn were ground into flour, parched, or popped.

Corn, also known as maize (zea mays), is a domesticated plant of the Americas. Along with many other indigenous plants like beans, squash, melons, tobacco, and roots, European colonists in America quickly adopted maize agriculture from Native Americans. Crops developed by Native Americans quickly spread to other parts of the world as well.

Over a period of thousands of years, Native Americans purposefully transformed maize through special cultivation techniques. Maize was developed from a wild grass (Teosinte) originally growing in Central America (southern Mexico) 7000 years ago. The ancestral kernels of Teosinte looked very different from today's corn. The first ears of maize were only a few inches long and had only eight rows of kernels. Cob length and size of maize grew over the next several thousand years which gradually increased the yields of each crop. Eventually the productivity of maize cultivation was great enough to make it possible and worthwhile for a family to produce food for the bulk of their diet for an entire year from a small area.

Native Americans of New England planted corn in household gardens and in more extensive fields adjacent to their villages. Fields were often cleared by controlled burning which enriched the soil and the plant and animal communities as well.

Agricultural fields consisted of small mounds of tilled earth placed a meter or two apart, sometimes in rows and other times randomly placed. Kernels of corn and bean seeds were planted in the raised piles of soil. The cornstalk then provided support for the bean vine to grow around. The spaces in between the mounds were planted with squash or melon seeds. The three crops complemented each other both in the field and in their combined nutrition.

Tribes in southern New England harvested great amounts of maize and dried them in heaps upon mats. The drying piles of maize often contained from 12 to 20 bushels of the grain. Surplus maize was stored in underground storage pits, ingeniously constructed and lined with grasses to prevent mildew or spoiling, for winter consumption of the grain.

By the time Christopher Columbus reached the New World in 1492, corn was grown from southern Canada to the Andes Mountains of South America. Early white settlers soon learned to depend upon corn as their main crop.

History says that it was corn that saved the Pilgrims that first winter in New England. The Native American farmers of the Ohio River Valley had been growing corn for over 1700 years when the first white men crossed the Appalachian Mountains.

Cornhusk Dolls:

Cornhusk dolls have been made by Northeastern Native Americans probably since the beginnings of corn agriculture more than a thousand years ago. Brittle, dried cornhusks become soft if soaked in water and produce finished dolls that were sturdy enough for Penobscot children's toys.

Both boy and girl dolls are made using the corn silk tassel for hair. Feet and body are stuffed with leaves and tied, while arms and legs are made from braided or rolled husks. Dolls measure anywhere between four and ten inches tall. Sometimes a face is drawn, or red dots are painted for cheeks; but more often than not the doll's face is left blank.

The dolls are often dressed in cornhusks, animal hide, or cloth, but some are made without clothing. Personal equipment was produced for many dolls, and this helped prepare children for everyday life. Girl dolls would be given cradleboards, hoes, and sewing kits, while boys could be provided with bows and arrows, canoe paddles, and warrior's gear.

Materials Needed:

- "Instructions for Corn Husk Dolls" for each student
- Husks from one or two ears of corn for each student (Contact your county Farm Bureau' to find out how to get corn husks.)
- String or twine
- Felt and/or fabric
- Buttons

Activity Outline:

1. Prepare the corn husks ahead of time. Husks should be removed from each ear of corn and dried in the sun for two to three days. (Save the silks for "hair.")
2. Discuss the information from the introduction with the students. You may want to copy the information for each student to read or you can also have students take turns reading a paragraph out loud to the class.
3. Hand out the "Instructions for Corn Husk Dolls" to each student. Each student should also receive about six husks from an ear of corn.
4. Have the students follow the directions to make their own corn husk doll. When the doll is complete the students may want to make a face and/or clothes for their doll. They can use felt, fabric, buttons, or anything else provided to make a face and clothes.

Discussion Questions:

1. How did people in Central and South America use the corn plant 7000 years ago?
2. How did the Native Americans of New England plant their agricultural fields?
3. What did people do with surplus maize?
4. What did Native American children learn from the use of their corn husk dolls?

Related Activities:

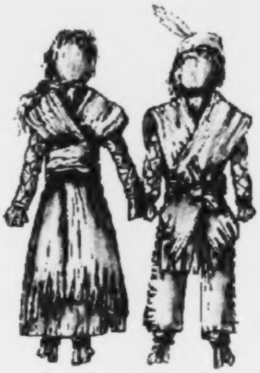
1. Research other uses of corn in early times.
2. Make a corn husk wreath.
   a. Soak 50-55 corn husk leaves in hot water with a bit of fabric softener for 10 minutes, remove and keep covered with a damp towel. As you work, remove only a few husks at a time so the others won't dry out and become brittle.
   b. Take each leaf and fold in half. Gather the ends together around a floral pick and wrap tightly with floral wire to hold in place.
   c. Insert the husks into a 12" straw wreath form, covering completely. Start at the bottom and work in one direction so all the husks lie in the same direction and overlap each other.
   d. Add small ears of ornamental corn or a dyed corn husk bow for color. Each student can decorate to their taste.

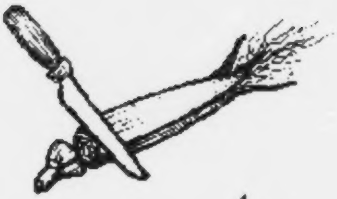
Lesson adapted from the web site with permission:
Native Tech: Native American Technology & Art
http://www.lib.uconn.edu/Native Tech
Copyright 1996-1998 Tara Prindle
e-mail: tprindle@nativetech.org

To be used with:
Making Corn Husk Dolls

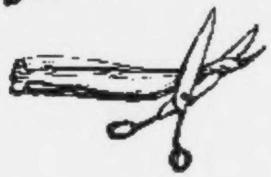
Name ______________________________

Instructions for Cornhusk Dolls

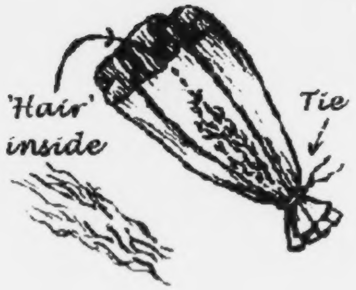




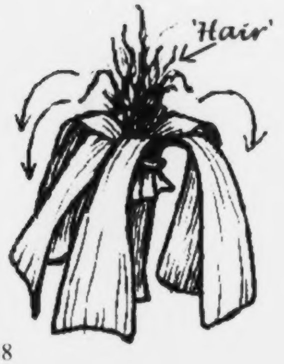
1. You will need the husks from one or two ears of corn for a six-inch doll. Cut the cob, remove the husks, and save the silks for hair. Dry everything in the sun for two to three days.



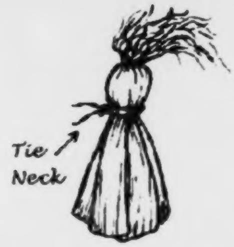
2. Soak the husks for 10 minutes before using them. Cut thin ends off.



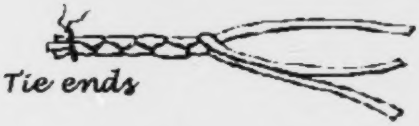
3. Bundle thin end of six leaves around 'hair,' slick side of leaves inward. Tie tightly.



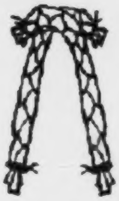
4. a. Peel leaves around to form head. Hair should sprout up in the middle.



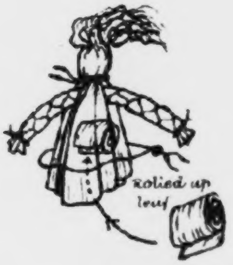
4. b. Tie neck area tightly.



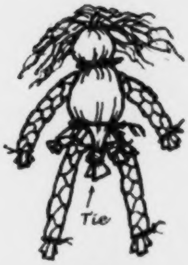
5. Braid three strips of a leaf into a six-inch piece for the arms.



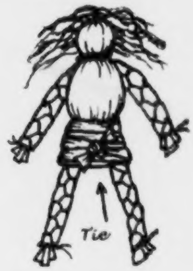
6. Braid two more lengths in the same way to use later for the legs.



7. Put arms under neck. Insert rolled leaf to fill out and form body. Tie waist area.



8. Insert legs and secure by tying two leaves front to back, then trim excess below waist.



9. Wrap and tie one or two strips around top of legs to form hips.

Adapted from the web site with permission:
Native Tech: Native American Technology of Art
http://www.nativeweb.org/NativeTech/cornhusk/dollinst.html
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Serving Up Food Safety

Grade Level: 4-6

Approximate Length of Activity: 20 minutes

Objectives:

Teacher:

1. Teach students safe food handling techniques to use in their homes.
2. Help students learn of safe food handling techniques used in grocery stores and restaurants.
3. Teach students about the causes of food spoilage, food-borne illness, and methods of food preservation.
4. Use an activity to show students the importance of hand washing.

Students:

1. Learn that restaurants and grocery stores have strict food safety guidelines.
2. Learn the causes of food-borne illness from foods.
3. Distinguish safe food handling techniques from unsafe techniques.
4. Use their experience with food at home to generate positive food safety rules.
5. Know the importance of hand washing.

Illinois Learning Standards: 22.A.2C; 22.B.2; 22.C.2; 23.B.2

Introduction:

Agriculture is the growing of food and fiber. Agribusinesses are involved in food processing, storage, or distribution. Restaurants and grocery stores sell food to us; therefore, they are considered to be an agribusiness. They, too, must follow health standards concerning food safety and are responsible for providing us with safe, quality food. Health inspectors routinely inspect these agribusinesses to make sure they are following the guidelines. If they find otherwise, they can penalize the business by closing it for a specific amount of time or perhaps indefinitely.

In the United States we are fortunate to have a government that makes food safety a priority. In some countries food may be produced or imported, but can be spoiled by pests or microorganisms due to poor storage. Pests (insects and rodents) and microorganisms (bacteria, mold, yeast) are the two chief causes of food spoilage. Food must be transported, stored, and prepared correctly to ensure its safety. Agribusinesses that deal with food must know where their food is coming from. They must also know how their food was grown and how it was transported.

All food will spoil if it is not preserved in some way. Some foods such as nuts and grains can be stored for a long time without spoiling. Other foods such as bread and milk must be consumed quickly. Foods can be preserved in many ways. Canning, freezing, and dehydrating are just a few methods. Spoilage may occur before there is a change in taste or odor. Therefore consumers should read expiration dates of food products bought from grocery stores before eating them.

People can reduce their risk of food-borne illness by handling food properly. Eighty-five percent of the cases of food-borne illness, a sickness caused by bacteria, can be avoided with proper food handling. Keys to food safety are washing hands, checking expiration dates, washing surfaces and utensils with hot, soapy water, refrigeration and freezing, rinsing fruits and vegetables, and storing foods in proper places.

Materials Needed:

- "Food for Thought" worksheet
- Cooking spray or vegetable oil
- Cinnamon
- Soap
- Paper towels
- Warm faucet water
- Cold faucet water

Activity Outline:

1. Talk with the students about safe food handling practices at their homes. Do they thoroughly wash dishes? Do they refrigerate food properly? Do they look for expiration dates on packages? Do they wash their hands with soap and warm water?
2. Ask the students to complete the worksheet entitled "Food for Thought." Through this worksheet, students will learn safe food handling practices and draw illustrations for their own safe food handling practices.
3. Use this activity to show students the importance of washing hands with soap and warm water.
    a. Apply cooking spray or vegetable oil to each student's hands.
    b. Sprinkle cinnamon on the palms, backs, and in-between the fingers of each student's hands. The cinnamon represents germs that get on our hands.
    c. Try to get rid of the cinnamon using only cold water. Discuss the results.
    d. Try to get rid of the cinnamon using soap and cold water. Discuss the results.
    e. Try to get rid of the cinnamon using soap and warm water. The cinnamon "germs" will rinse right off of the students' hands and into the sink.

f. Ask the students why the cinnamon stayed on their hands until they used soap and warm water. How is this similar to washing germs off of our hands? Is it important to use soap and warm water for hand washing?

Discussion Questions:

1. What are the chief causes of food spoilage?
2. What are some safe food handling practices that can be used in your home?
3. What are some food preservation methods that are used before foods reach the grocery store?
4. What responsibilities do agribusinesses such as grocery stores and restaurants have?
5. Why is it important to use soap and warm water when washing your hands?

Related Activities:

1. Tour a restaurant. What types of food safety methods are used?
2. Add a slice of bread and a little water to a sealable plastic bag. What happens? Chart your observations over time.

Other Resources:

Food for America, a resource guide. National FFA Organization, 6060 FFA Drive, P.O. Box 68960, Indianapolis, IN 46268. 1-888-332-2668.

To be used with:
Serving Up Food Safety

Name ______________________________

Food for Thought

Draw a picture for each statement that shows the right method and the wrong method. (Example for #1 – Someone washing their hands vs. someone sitting at a table with dirty hands.)

1. Always wash your hands before handling food.

Right **Wrong**

2. Eat food before the expiration date on the package.

Right **Wrong**

3. Do not cut meat and vegetables on the same surface or with the same knife. Wash the surface with hot, soapy water to kill bacteria.

Right **Wrong**

4. Refrigerate or freeze foods that spoil.

Right **Wrong**

5. Rinse fruits and vegetables before eating or cooking.

Right **Wrong**

6. What are some other food safety methods? Draw right and wrong pictures for these methods.

Right **Wrong**

Right **Wrong**

Risks vs. Benefits in Food Production

Grade Level: 4-6

Approximate Length of Activity: 30-40 minutes

Objectives:

Teacher:

1. Integrate food production into the subject area of safety.
2. Present information about food additives and make students aware of rules involved in food processing.

Students:

1. Explain why additives in food production and processing pose both risks and benefits.
2. Become aware that local, state, and national governments have rules about how to produce and process food to make sure that it is wholesome to eat.

Illinois Learning Standards: 12.B.2a; 23.B.2

Introduction:

The United States has the most abundant supply of food in the world. Local, state, and national governments have regulations to make sure food is safe. The U.S. Department of Agriculture (USDA) inspects foods—fresh, canned, frozen, and prepared in other ways. If a contaminated sample is found, the USDA can pull that shipment out of the marketplace. The Environmental Protection Agency (EPA) determines which pesticides may be used on what foods and the maximum residue levels. The Federal Food and Drug Administration (FDA) monitors the food supply for compliance. They monitor package claims including ingredients, nutrition, and net weight. Local and state governments can impose their own laws to regulate food supplies.

Though sometimes food ingredients are not easy to pronounce, those additives are in our food for a reason. Additives help make our food safer, more economical, and appealing. Without additives like calcium propionate and potassium sorbate, breads would mold within just a day or two. BHA helps preserve products like granola bars. Sodium nitrite gives bacon its distinctive flavor. Natural and artificial flavors and colors make many of our foods taste better and look more appetizing.

Salt and sugar are the two most common food additives. Salt brings out the flavor of ingredients but also serves as a preservative. Early sailors and pioneers salted meat on their journeys. Sugars come in many different forms—sucrose, dextrose, honey, and corn syrup—

just to name a few. These ingredients are also added for flavor and preservation. With today's health concerns about too much salt possibly causing high blood pressure and too much sugar causing obesity, many products can now be purchased in low-salt or low-sugar versions.

Some food additives pose risks. Several sugar substitutes have been linked to cancer in laboratory animals when consumed in large quantities. However, not using additives poses risks, too. Each consumer must determine if the benefits outweigh the risks based on scientific data.

The use of pesticides enable us to grow more food for less money. A study from Texas A & M states, "The average American household (2.5 people) would spend $228 more per year for food if pesticides were eliminated. If inorganic nitrogen fertilizers were also banned, the cost of food would rise $428 per year. For a middle income family, this would amount to a 12% increase in their weekly food bill." (From GRC Economics, Texas A & M, American Vegetable Grower.) Eliminating ag chemicals would also mean people would eat less healthy fruits and vegetables because their cost would increase or they may not even be available for purchase.

The EPA determines the greatest amount of residue that can be consumed safely, and then sets a limit 100-1,000 times less than this amount. In 1998, the FDA found that 99 percent of foods produced in the U.S. and 97 percent of imported foods tested met these standards for pesticide residues.

The average American life expectancy has increased by nine years in the 40 years that pesticides have been used. Farmers do not use any more pesticides than absolutely necessary to grow a healthy product. They must complete training programs and be tested and certified to apply pesticides. As with agricultural chemicals, the directions on household and lawn and garden pesticide labels aren't just suggestions, they are the law. Research scientists are looking for additional ways in which farmers can reduce pesticide usage. Farmers use integrated pest management practices and scout fields for pests before applying chemicals.

An average pesticide is researched and tested for safety for nine years at a cost of $35 million before it can be marketed. Included in this group are pesticides such as flea collars for dogs, garden sprays, and home termite, roach, and ant killers.

Glossary:

Additive:	A substance added in small amounts to something else to improve, strengthen, or otherwise alter it.
Benefit:	Anything that promotes or enhances well-being; advantage.
Fungi:	Any group of plants that lack flowers, leaves, or chlorophyll and get their nourishment from dead or living organic matter; includes mushrooms, molds, and yeasts.
Nematode:	Any of a class of slender, unsegmented, cylindrical worms.
Pesticide:	Any chemical used to kill pests (harmful insects, weeds, rodents, fungi, and nematodes).
Risk:	The possibility of suffering harm or loss.
Weed:	A useless or troublesome plant, either growing wild or in cultivated ground to the exclusion or injury of the desired crop.

IPM: Pest management that uses techniques to maintain pest levels that are below economically accepted levels of damage or loss.

Materials Needed:

- "Pest Popping" worksheet
- "Risks vs. Benefits" worksheet
- Dictionaries

Activity Outline:

1. Before the lesson, discuss with the students the information from the introduction so they are aware of rules about food processing.
   a. Discuss with students how some words are created from combinations of other words. Explain how, by using parts of words, you can define them. An example is the word "pesticides." The root "cide" means "to kill." When combined with the word "pest" it means "to kill pests."
   b. Have students use the "Pest Popping" worksheet to determine which pesticide controls which pest.
2. Ask students to give meanings of the words "risk" and "benefit." Explain that every action we take has both risks and benefits. Have students give examples of different actions and list the risks and benefits of them.
3. Have the students complete the "Risks vs. Benefits" worksheet.
4. Have students make posters of how to keep processed food (canned, fresh, frozen, packaged) safe in the home.

Discussion Questions:

1. How would the food supply be affected if farmers did not use pesticides? Discuss how this relates to food production.
2. Discuss the overall risks and benefits of agricultural chemical use. Discuss how this relates to food production.

Related Activities:

1. Have students bring in food labels. Examine them for additives. Discuss the purpose of the additives in processing the food.
2. Compare different brands of the same type of food—canned green beans for example. Compare the name brand with the generic brand. Does one use more additives than the other?
3. Bring in news articles about "recalls" of food products. Have the students explain why the food was "recalled."
4. Make a class list of as many words as possible that end with "cide" and their meanings.

To be used with:
Risks vs. Benefits in Food Production

Name ____________________________

Pest Popping

Farmers use pesticides to control pests that harm crops and livestock. Each kind of pesticide is named for the kind of pest it kills. Match the pest with the pesticide used to control it. You might need to use a dictionary.

Pests

1. ____________________ Plants, especially weeds.

2. ____________________ Worms of the phylum Nematoda which have unsegmented, threadlike bodies and may be parasitic; microscopic worms.

3. ____________________ Insects

4. ____________________ Mammals of the order Rodentia, such as rats and mice characterized by large front teeth adapted for gnawing or nibbling.

5. ____________________ Plants that are not green, such as yeasts, molds, smuts, and mushrooms, which cause diseases on other plants.

Pesticides

a. rodenticide
b. herbicide
c. nematicide
d. insecticide
e. fungicide

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Pest Popping

Farmers use pesticides to control pests that harm crops and livestock. Each kind of pesticide is named for the kind of pest it kills. Match the pest with the pesticide used to control it. You might need to use a dictionary.

Pests

1. **b** Plants, especially weeds.

2. **c** Worms of the phylum Nematoda which have unsegmented, threadlike bodies and may be parasitic; microscopic worms.

3. **d** Insects

4. **a** Mammals of the order Rodentia, such as rats and mice characterized by large front teeth adapted for gnawing or nibbling.

5. **e** Plants that are not green, such as yeasts, molds, smuts, and mushrooms, which cause diseases on other plants.

Pesticides

a. rodenticide
b. herbicide
c. nematicide
d. insecticide
e. fungicide

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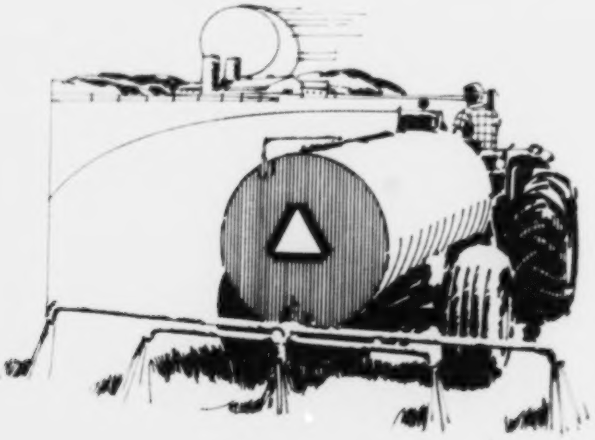
To be used with:
Risks vs. Benefits in Food Production Name ______________________

Risks vs. Benefits

The use of agricultural chemicals has both risks and benefits. Determine whether each statement represents a risk or a benefit and write your answer on the line.

1. _______ More food can be produced using agricultural chemicals.
2. _______ Farmers may become ill if they apply agricultural chemicals improperly.
3. _______ Agricultural chemicals destroy disease-carrying insects.
4. _______ Federal, state, and local governments strictly regulate usage of ag chemicals.
5. _______ Excessive use of agricultural chemicals may cause runoff into rivers, ponds, and lakes, harming fish and other wildlife.
6. _______ Agricultural chemicals can lower crop production costs for farmers.
7. _______ If the wind blows agricultural chemicals onto other kinds of plants, those plants may be harmed.
8. _______ Agricultural chemicals help the U.S. have the most abundant supply of safe food in the world.



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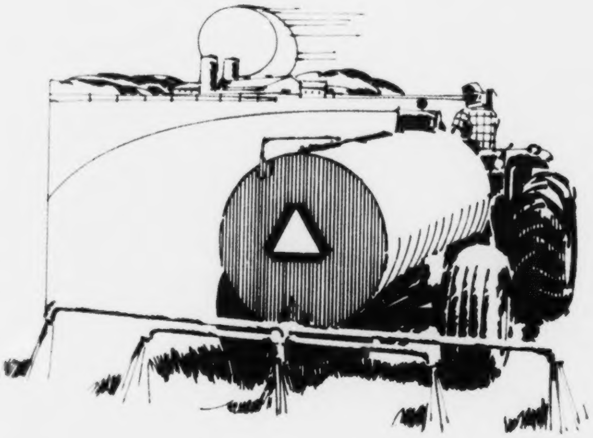
To be used with:
Risks vs. Benefits in Food Production **Answer Key**

Risks vs. Benefits

The use of agricultural chemicals has both risks and benefits. Determine whether each statement represents a risk or a benefit and write your answer on the line.

1. **Benefit** More food can be produced using agricultural chemicals.
2. **Risk** Farmers may become ill if they apply agricultural chemicals improperly.
3. **Benefit** Agricultural chemicals destroy disease-carrying insects.
4. **Benefit** Federal, state, and local governments strictly regulate usage of ag chemicals.
5. **Risk** Excessive use of agricultural chemicals may cause runoff into rivers, ponds, and lakes harming fish and other wildlife.
6. **Benefit** Agricultural chemicals can lower crop production costs for farmers.
7. **Risk** If the wind blows agricultural chemicals onto other kinds of plants, those plants may be harmed.
8. **Benefit** Agricultural chemicals help the U.S. have the most abundant supply of safe food in the world.



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Calling for Cattle

Grade Level: 4-6

Approximate Length of Activity: 45 minutes

Objectives:

Teacher:

1. Teach students about beef and beef cattle by-products.
2. Help students understand the concepts "vertical," "horizontal," and "diagonal" while playing bingo.

Students:

1. Learn about beef by-products while playing bingo.
2. Show an understanding of "vertical," "horizontal," and "diagonal" while playing bingo.
3. Learn about the nutritional value of beef.

Illinois Learning Standards: 12.A.2a; 12.B.2a; 15.A.2a; 22.A.2b; 23.A.2

Introduction:

Almost the entire beef animal can be used to benefit man in some way. From a typical 1000 pound steer, 400 pounds is used for beef that we eat and the remaining 600 pounds are used as by-products.

Some common types of beef are pot roast, sirloin steak, ground beef, rib eye steak, and tenderloin steak. Beef is a good source of protein (which builds, maintains, and repairs body tissues), iron (which helps the red blood cells carry oxygen to body cells and tissues), zinc (which is a mineral used for growth and maintaining the immune system), and B-vitamins (which promote healthy skin, keeps the nervous system healthy, and are important for digestion and metabolism).

Beef by-products are anything made from a beef animal other than beef. You probably use more beef by-products than you think! One of the most important cattle by-products is insulin, a treatment for people with diabetes. Other by-product examples include:

Bone, Horn, Hooves, & Gelatin

Combs, gelatin candy (Gummy Bears), marshmallows, mayonnaise, gelatin, photographic film, steel ball bearings with bone charcoal, fine bone china, pet food, and vitamin capsules/ gel coatings.

Hide & Hair

Insulation, paint brushes, glue for bookmaking and Band-Aids™, clothes, shoes, luggage, saddles, furniture, automobiles, volleyballs, basketballs, and baseball gloves.

Fats & Fatty Acids

Shampoo, soaps, shaving creams, cosmetics, deodorants, candles, crayons, floor wax, detergents, hydraulic brake fluid, plastics, insecticides, paints, perfumes, and synthetic rubber.

Materials Needed:

- "Beefo Bingo" game boards
- "By-products Board Pieces" sheet
- Container (large cardboard or storage box, etc.)

Activity Outline:

1. Discuss the introduction information with your students.
2. Make enough copies of the game board and the game board pieces so each student has one. Give each student one "Beefo Bingo" game board and one "By-products Board Pieces" sheet.
3. Have the students cut out the by-products pieces. Then they should select 24 of them and glue them to the game board. The center square is a free spot so nothing should be glued there. You may want to laminate the boards after they are put together. (Or you could put the boards together beforehand instead of having the students do it.)
4. The teacher should laminate one by-products sheet to keep track of what by-products have been called. Another by-products sheet can be cut up and put into a container to "call" the products.
5. Give the students "markers" for their game boards. Markers could be miniature marshmallows, peanuts, grain kernels, buttons, etc.
6. The teacher or caller reaches into the container and draws out a by-product piece, then calls this out to the group.
7. The students look at their board to see if they have that by-product. If they do, then they cover it up with a marker.
8. The first student to have five squares in a row covered, either vertically, horizontally, or diagonally wins. (Make sure the students understand the meaning of vertically, horizontally, and diagonally before beginning.)

Discussion Questions:

1. Name five beef by-products.
2. What parts of a beef animal are used for by-products?
3. Name some common types of beef that are eaten.

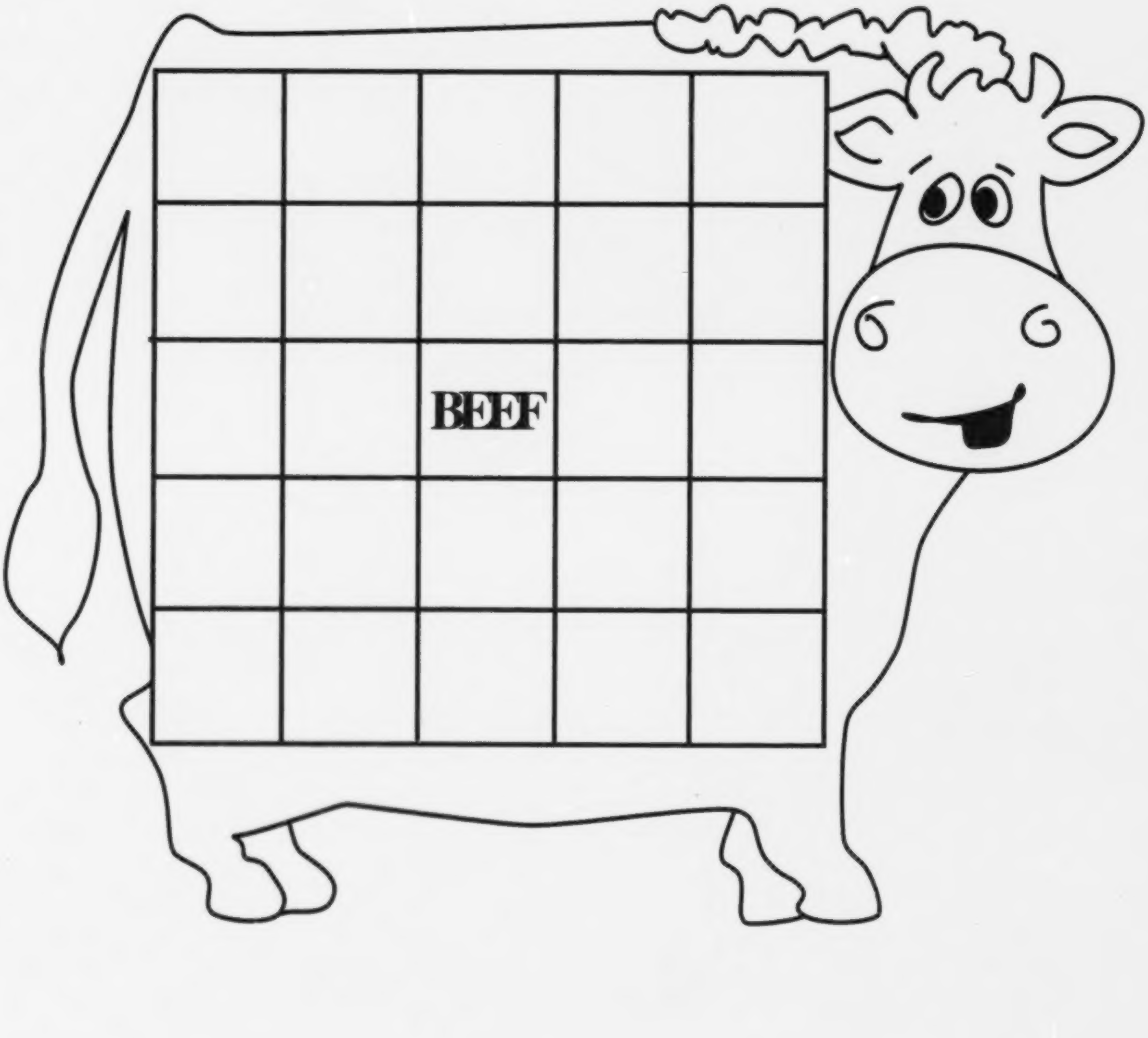
Related Activities:

1. *Read Your Calf: A Kid's Guide to Raising and Showing Beef and Dairy Calves* by Heather Smith Thomas.
2. Compare the nutritional value of beef to other types of food.
3. Visit the web site http://www.beef.org for more information.

To be used with:
Calling for Cattle

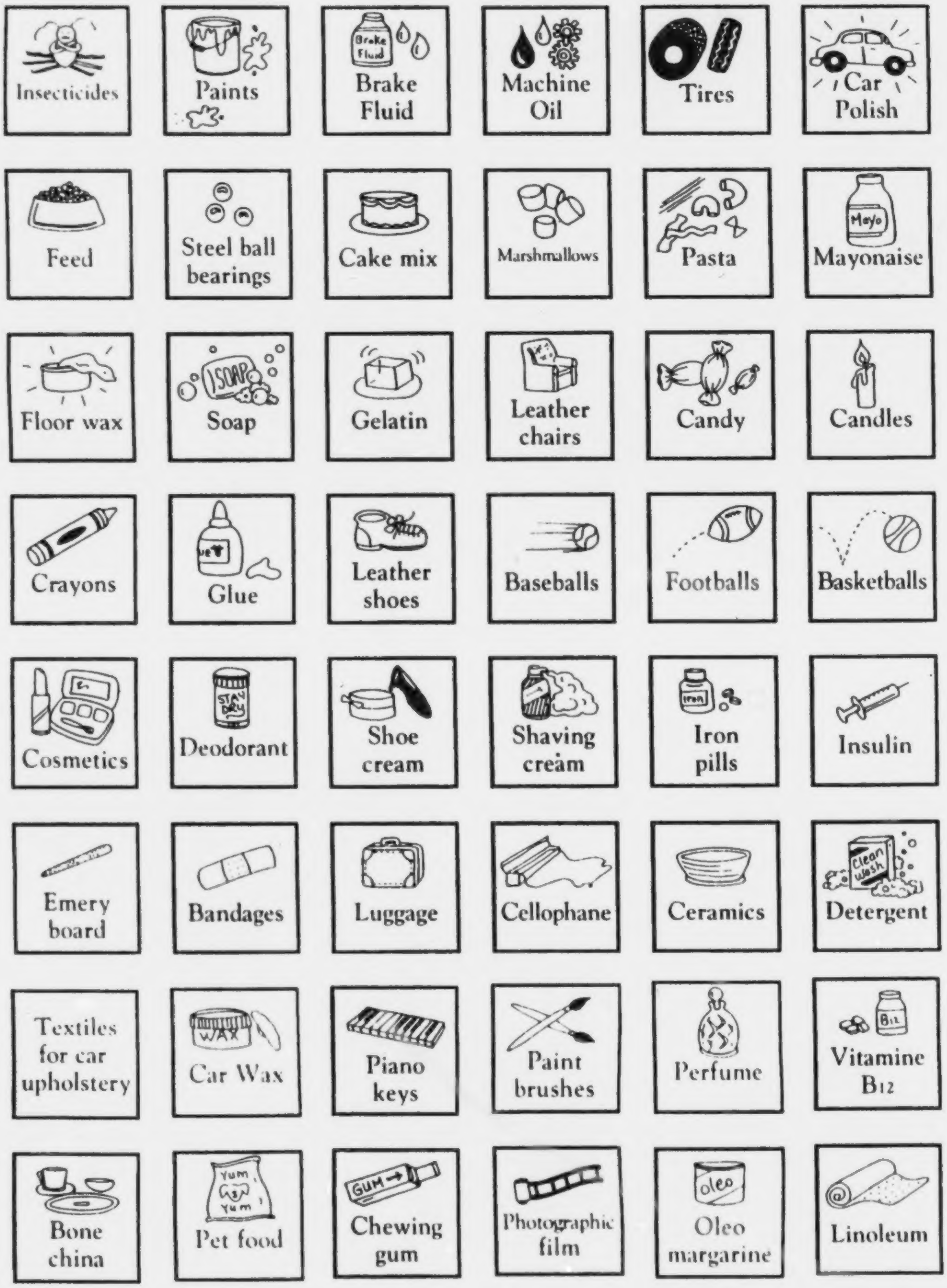
Game Board

Beefo Bingo



To be used with:
Calling for Cattle

By-products Board Pieces


Insecticides
Paints
Brake Fluid
Machine Oil
Tires
Car Polish
Feed
Steel ball bearings
Cake mix
Marshmallows
Pasta
Mayonaise
Floor wax
Soap
Gelatin
Leather chairs
Candy
Candles
Crayons
Glue
Leather shoes
Baseballs
Footballs
Basketballs
Cosmetics
Deodorant
Shoe cream
Shaving cream
Iron pills
Insulin
Emery board
Bandages
Luggage
Cellophane
Ceramics
Detergent
Textiles for car upholstery
Car Wax
Piano keys
Paint brushes
Perfume
Vitamine B12
Bone china
Pet food
Chewing gum
Photographic film
Oleo margarine
Linoleum

Soybean Scramble

Grade Level: 4-6

Approximate Length of Activity: 45 minutes

Objectives:

Teacher:

1. Teach students about the nutritional value of soybean products.
2. Assist students in identifying and spelling soybean products.
3. Help improve students' memory skills
4. Improve students' ability to follow directions.

Students:

1. Discover the importance of soybeans to our world by identifying products.
2. Demonstrate a knowledge of the nutritional value of soybean products by naming ways they help our bodies.
3. Recall and spell soybean product names.

Illinois Learning Standards: 22.A.2b; 23.B.2

Introduction:

After soybeans are harvested, they are sold to a grain elevator or stored in a grain bin. When soybeans are sold, they are taken to processing plants or exported. At the processing plant, the hulls (outer coverings) are removed and used as additives for breads, cereals, snacks, and livestock feed. The inside of the bean is flattened into flakes and the oil may be removed. The inside of the bean is used for things such as livestock feed, baked goods, dairy products, cooking oil, margarine, and much more.

Soybeans are called "The Miracle Seed" because they are used for so many things. Soybeans are mostly used as livestock feed, but they also provide industrial products such as: soybean oil, medicines, soy ink, biocomposite building materials, paints, soaps, plastics, biodiesel fuel, soybean crayons, and non-toxic solvents and cleaners.

Soybeans are used in many foods because they are high in protein and also have calcium, phosphorus, iron, vitamin A, thiamin, and riboflavin. Some foods made with soybeans are: coffee creamers, granola bars, pasta, frozen dinners, cake mixes, donuts, sausage, frozen pizza, pancake mix, soy sauce, diet drinks, stuffing mix, cookies, salad oil, mayonnaise, infant formula, chocolate, margarine, crackers, soymilk, tofu, yeast, candy, shortening, bread, and cereals.

According to university scientists, soy ingredients in food can help our bodies in several ways. Soy protein foods may cut heart disease risk by 25 to 30 percent, if eaten as a regular part of a diet low in saturated fat and cholesterol. Studies suggest soy may also cut the risk of osteoporosis and fractures in later years of life by increasing bone density. Soy products may also fight cancer through a unique chemical called genistein which suppresses the growth of cancer cells.

Materials Needed:

- "Soybean Scramble Game Pieces"
- "Supermarket Scramble" worksheet
- "Soybean Scramble Directions" handout
- Paper
- Pencils

Activity Outline:

1. Discuss the products that are made from soybeans with the students.
2. Pass out the worksheet "Supermarket Scramble" to each student. Have them check off the products listed that are made with soybeans. When they are done, ask the students what products they checked. Then tell them that each product listed on the page is made from soybeans.
3. Prepare the game pieces for the Soybean Scramble game. Copy each sheet of "Soybean Scramble Game Pieces" and cut the pieces apart. (You may want to laminate the game pieces and then cut them apart.) Each group of students will need a complete set of game pieces. Figure out how many copies you will need by dividing the class into groups of four or five, whichever works best.
4. Split the students into groups of four (or five). Pass out a complete set of game pieces to each group. Make sure each group has a piece of paper and a pencil for someone to keep score. Have the groups decide which player goes first, second, third, and fourth and decide who will keep score.
5. Have the groups shuffle or mix their cards up well. Place the cards in one stack, face down.
6. Write the following directions on the board or make copies of the "Soybean Scramble Directions" for students to refer to:
   a. Have each player draw ten cards. The first player tries to make a word that relates to soybeans with his/her cards (letters). The player can use as many letters out of their ten cards to make a word.
   b. If the player makes a word, he/she must lay the word face up on the table, say the word, and spell it. The other players can check the word. If the word is spelled correctly and it is a soybean product, the student may total the points on the cards used and have the score keeper write down the word the student made and the number of points. Place the word (cards) aside in a stack. The player keeps the cards that were not used in the word for his next turn. During the next turn the player draws the same number of cards that were used in his word. For instance, if

a player draws ten cards, makes a word with six cards in it, then during the next turn he draws six new cards (for a total of ten in their hand).

c. If the player cannot make a word, once during each turn the player can trade in up to five cards for new cards. The player chooses up to five cards he/she doesn't like, puts them face down at the bottom of the card stack, and draws the same number of cards from the top. Now the player's turn is over. He/she must wait until his/her next turn to play. (Trading cards count for one turn.)

d. When the playing stack of cards runs out, shuffle the word cards stack and start a new playing stack.

e. The first player to reach 100 points wins.

Discussion Questions:

1. Why are soybean products nutritional?
2. What are some soybean food products? What are some non-food products?
3. What soybean products surprised you? (Did you realize that all the products on the "Supermarket Scramble" worksheet list were soybean products?)

Related Activities:

1. Use soybean products such as soy oil margarine, soy flour, and tofu for cooking and baking.
2. Research George Washington Carver who discovered that soybeans have valuable protein and invented many uses for them.

Other Resources:

1. Illinois Farm Bureau® Ag in the Classroom produces an educational magazine called *Ag Mag* 10 with more information and activities on soybeans. Call your county Farm Bureau® to receive free copies of this interesting magazine for students.
2. Illinois Soybean Association, Illinois Soybean Checkoff Board: www.ilsoy.org
3. American Soybean Association: www.oilseeds.org/asa
4. Soybean Statistics: www.ag.uiuc.edu/~stratsoy/96soystats/pg2.html

A 1	A 1	A 1
A 1	A 1	A 1
A 1	A 1	A 1
A 1	A 1	A 1
A 1	A 1	A 1
B 3	B 3	B 3
B 3	B 3	J 8

To be used with:
Soybean Scramble

Game Pieces

C 3	C 3	C 3
C 3	C 3	C 3
C 3	C 3	C 3
C 3	C 3	C 3
C 3	C 3	C 3
G 2	G 2	G 2
G 2	G 2	G 2

To be used with:
Soybean Scramble

Game Pieces

L 1	L 1	L 1
L 1	L 1	L 1
L 1	L 1	L 1
L 1	D 2	D 2
D 2	D 2	D 2
D 2	D 2	F 4
F 4	F 4	F 4

To be used with:
Soybean Scramble

Game Pieces

E 1	E 1	E 1
E 1	E 1	E 1
E 1	E 1	E 1
E 1	E 1	E 1
E 1	E 1	E 1
P 3	P 3	P 3
P 3	P 3	Z 10

H 4	H 4	H 4
H 4	K 5	K 5
K 5	N 1	N 1
N 1	N 1	N 1
N 1	N 1	N 1
N 1	N 1	V 4
V 4	V 4	V 4

I 1	I 1	I 1
I 1	I 1	I 1
I 1	I 1	I 1
I 1	I 1	I 1
I 1	I 1	I 1
M 3	M 3	M 3
M 3	M 3	Q 10

To be used with:
Soybean Scramble

Game Pieces

O 1	O 1	O 1
O 1	O 1	O 1
O 1	O 1	O 1
O 1	O 1	O 1
O 1	O 1	O 1
R 1	R 1	R 1
R 1	R 1	R 1

To be used with:
Soybean Scramble

Game Pieces

R 1	R 1	S 1
S 1	S 1	S 1
S 1	S 1	S 1
S 1	S 1	S 1
T 1	T 1	T 1
T 1	T 1	T 1
T 1	T 1	T 1

To be used with:
Soybean Scramble

Game Pieces

U 1	U 1	U 1
U 1	U 1	U 1
U 1	U 1	U 1
U 1	W 4	W 4
W 4	W 4	X 8
Y 4	Y 4	Y 4
Y 4		

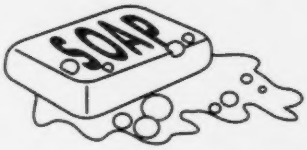
To be used with:
Soybean Scramble

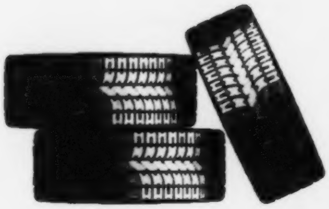
Name ______________________

Supermarket Scramble

How many products can you find in a grocery store that are made with soybeans? Check off each product listed below that is made from soybeans!

- ☐ **Soybean oil**
- ☐ **Soy milk**
- ☐ **Tofu**
- ☐ **Salad oil**
- ☐ **Margarine**
- ☐ **Mayonnaise**
- ☐ **Shortening**
- ☐ **Paint**
- ☐ **Soap**
- ☐ **Candy**
- ☐ **Tires**
- ☐ **Glue**
- ☐ **Infant formula**
- ☐ **Soybean Crayons**
- ☐ **Cosmetics**
- ☐ **Chocolate**
- ☐ **Coffee creamer**
- ☐ **Breakfast cereals**
- ☐ **Soup**
- ☐ **Pasta**
- ☐ **Granola Bars**
- ☐ **Yeast**
- ☐ **Plywood**
- ☐ **Linoleum**
- ☐ **Cake mixes**
- ☐ **Bread**
- ☐ **Donuts**
- ☐ **Sausage**
- ☐ **Frozen Pizza**
- ☐ **Pancake mix**
- ☐ **Soy sauce**
- ☐ **Diet drinks**
- ☐ **Crackers**
- ☐ **Stuffing mix**
- ☐ **Cookies**
- ☐ **Frozen dinners**





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To be used with:
Soybean Scramble

Soybean Scramble Directions

1. **Have each player draw ten cards. The first player tries to make a word that relates to soybeans with his/her cards (letters). The player can use as many letters out of his ten cards to make a word.**

2. **If the player makes a word, he/she must lay the word face up on the table, say the word, and spell it. The other players can check the word. If the word is spelled correctly and it is a soybean product, the student may total the points on the cards used and have the score keeper write down the word the student made and the number of points. Place the word (cards) aside in a stack. The player keeps the cards that were not used in the word for their next turn. During his/her next turn the player will then draw the same number of cards that were used in their word. For instance, if a player draws ten cards, makes a word with six cards in it, then during his next turn he draws six new cards (for a total of ten in their hand).**

3. **Once during each turn the player can trade in up to five cards for new cards if he cannot make a word. The player chooses up to five cards he/she doesn't like, puts them face down at the bottom of the card stack, and draws the same number of cards from the top. Now his turn is over. He/she must wait until his/her next turn to play. (Trading cards count for one turn.)**

4. **When the playing stack of cards runs out, shuffle the word cards stack and start a new playing stack.**

5. **The first player to reach 100 points wins.**

Oxygen Givers

Grade Level: 4-6

Approximate Length of Activity: 30 minutes

Objectives:

Teacher:

1. Teach students how trees make food with carbon dioxide, water, and light.
2. Teach students about transpiration and the water cycle through discussion and an experiment.

Students:

1. Learn how plants make food with carbon dioxide, water, and light.
2. Learn how plants lose water through transpiration.
3. Construct an experiment which demonstrates how water vapor from plants is part of the water cycle.

Illinois Learning Standards: 11.A.2b; 11.A.2e; 12.A.2a; 12.B.2a

Introduction:

Leaves on a tree have a very important job. They are in charge of making food for the tree. In order to make food, the leaves need carbon dioxide, water, and light. Leaves obtain carbon dioxide from the air through tiny pores on the leaves' outer surface. Water is absorbed by the roots of the tree. The xylem, which are tiny tubes in the tree, transport the water through the trunk, branches, and to the leaves. The cells in the leaves contain tiny green bodies, called chloroplasts. Chloroplasts contain chlorophyll. Chlorophyll absorbs energy from light. The chlorophyll splits the water molecule into hydrogen and oxygen molecules. Hydrogen and carbon dioxide from the air combine to form sugar. This process is known as photosynthesis. The sugar is then transported to other parts of the tree. Tree cells burn this sugar to provide energy for growth and other processes. The sugar could also be altered to form fats or starches, or combined with minerals to form vitamins and protein. The oxygen left over from photosynthesis is released into the air for us to breathe.

Not all of the water trees absorb is used to make food for the tree. Some of the water is lost through transpiration. When the sun warms the water inside the leaves, the water changes to water vapor. This water vapor then escapes through the pores on the leaves. Transpiration helps to put moisture back into our air. This added moisture helps make rain.

Materials Needed:

Need two of each per student or group:

- Clear, plastic cups
- Sandwich bag – not a sealable bag
- Leafy twigs
- Clear tape
- Water

Activity Outline:

1. Have each student (or group) fill two cups three-fourths with water.
2. Remove the leaves from *one twig*.
3. Place a plastic bag over each twig and tape tightly.
4. Place each twig in a cup of water.
5. Place the cups in the sunlight for a couple of days.
6. After a couple of days, discuss with the class what has happened. How do leaves give us oxygen and water?

Discussion Questions:

1: How do plants make food?
2. What is chlorophyll?
3. What is photosynthesis?
4. What is transpiration?

Related Activities:

1. Place plants in different areas of the classroom such as sunny areas, shady areas, dark areas, etc. Compare the growth rate and characteristics of both throughout a week or two.
2. Make Your Own Water Cycle!
    a. Materials Needed: Large clear plastic bowl, small container (small butter tub will work), small object for a weight (such as a rock), clear plastic wrap, and water.
    b. Place the small container in the middle of the large, clear plastic bowl. Put about a half inch of water in the bottom of the large bowl.
    c. Cover the large bowl with plastic wrap, securely sealing it to the sides of the bowl.
    d. Place the small weight (rock) in the middle of the plastic wrap.
    e. Leave the bowl in a safe place in the sun.
    f. What should happen: The sun's heat should evaporate the water. The evaporated water will rise and condense on the cool plastic. The condensed water will then fall into the small container.

Other Resources:

1. Project Learning Tree, 1250 Connecticut Ave., NW, Washington, DC 20036.
2. American Forestry Association, Global Releaf Program, P. O. Box 2000, Washington, D.C. 20013, (202) 667-3300.
3. National Arbor Day Foundation, 100 Arbor Ave., Nebraska City, NE 68410, (402) 474-5655.
4. Trees for Life, Inc., 1103 Jefferson, Wichita, KS 67203, (316) 263-7294.
5. Illinois Council on Forestry Development, 110 Mumford Hall, 1301 West Gregory Drive, Urbana, Illinois, 61801, (217) 333-2770.
6. Illinois Department of Conservation, Division of Forest Resources, 524 south Second Street, Springfield, Illinois 62701, (217) 782-2361.
7. International Society of Arboriculture, P. O. Box 908, Urbana, Illinois 61801.

Bug Out the Big Ones

Grade Level: 4-6

Approximate Length of Activity: One class period

Objectives:

Teacher:

1. Assist students in learning the importance of using pesticides and fertilizers.
2. Integrate science and fine arts in their study of these chemicals.

Students:

1. Learn what pesticides and fertilizers are.
2. Learn the good and bad aspects of using chemicals on crops.
3. Demonstrate their knowledge of using these products safely by creating a poster.

Illinois Learning Standards: 22.A.2b; 22.C.2; 26.B.2d

Introduction:

Pesticides are chemicals used to control or eliminate pests. Pesticides are used on crops because they are currently one of the safest and most effective ways to control pests. Pests reduce the quality and quantity of our food supply. Pesticides control pests such as flies, mosquitoes, and ticks, which carry diseases. This helps to protect our health and the health of our animals. There are more than 10,000 insects, 1500 fungus-caused diseases, and 1800 weeds that can impair our food supply. Without the use of crop protection products, our current agricultural abundance would not be possible.

There are four types of pesticides that are commonly used. These are insecticides, herbicides, fungicides, and rodenticides. Insecticides are used to protect crops from insect damage. Insecticides are also used in buildings and homes to control ants, flies, moths, roaches, and termites. Herbicides control weeds or eliminate plants that grow where they are not wanted. Herbicides are used in fields, parks, lakes, ponds, and yards. Fungicides are used to control plant diseases that affect food crops. Rodenticides are mostly used in areas where rats and other rodents are a major health problem.

It takes a lot of testing for a new pesticide to reach the market. It undergoes years of laboratory testing and then field testing. Each year, about 15,000 applications are submitted to register a new pesticide. These pesticides go through six to nine years of testing, both in the laboratory and the field. The pesticides that can be safely used without harming the environment are then registered. Each year only about fifteen new pesticides are registered.

These pesticides are then labeled with instructions for proper use, including handling, storage, and disposal. In order to handle a restricted use pesticide, Illinois farmers and commercial applicators must complete an approved training program in the proper handling of toxic chemicals. The regulation of pesticides is controlled by the United States Environmental Protection Agency. Each state may also establish requirements for pesticides.

Fertilizers supply concentrated nutrients that promote higher yields and better quality crops at lower costs. Plants, or crops, need nutrients in order to grow. Some nutrients are supplied by the soil; however, the soil does not have enough nutrients to be able to grow enough food for the world's population. This is why farmers fertilize their fields. Fertilization also enables crops to withstand infestation of some pathogens and to speed crop recovery from several forms of stress.

A soil test is conducted before a farmer fertilizes his or her field. A soil test consists of collecting many soil samples from a field and testing the samples according to what nutrient the farmer wants to analyze. By soil testing, the farmer can determine the rate of application and the most appropriate placement of the fertilizer.

There are sixteen nutrients that a plant needs to grow normally. Of these nutrients, nitrogen (N), phosphorus (P), and potassium (K) are three of the most important nutrients needed.

Nitrogen is part of the makeup of all plant proteins. If a plant is deficient in nitrogen, it will develop a pale yellowish-green color in the leaves. This means that the plant's chlorophyll production will also slow down since nitrogen is required for the plant to produce chlorophyll. Plants adequately supplied with nitrogen are better able to utilize water from rainfall and soil moisture. Nitrogen helps to increase crop yields and provide a higher quality crop.

Potassium helps to protect plants against diseases. Potassium also helps crops to withstand droughts, cool soils, flooding, and insects. Potassium improves shipping, handling, and storage qualities so our fruits and vegetables will stay fresh longer.

Phosphorus helps to protect plants from diseases and improve crop yield and quality. Phosphorus enables plants to overcome environmental stresses such as cold temperatures and drought.

Materials Needed:

- Poster board (or construction paper)
- Art supplies

Activity Outline:

1. Begin by introducing the words pesticide and fertilizer. Ask what the students already know about these crop protection products.
2. Explain that pesticides are used to control insects, weeds or unwanted plants, diseases, and rodents. Farmers do not use any more pesticides than absolutely necessary to grow a healthy product. They must complete training programs and be tested and certified to apply restricted use pesticides. If pesticide use was banned, people would eat less fruits and vegetables because of their poor

quality and high cost. Fruits and vegetables have been shown to reduce the risk of most cancers. Pesticides reduce the cost of producing fruits and vegetables making them affordable to the public.

3. Continue the discussion about fertilizers. Explain that to grow, plants need nitrogen, phosphorus, and potassium, among other nutrients. These nutrients must be applied in the proper ratio to work correctly. Farmers are doing many things to make sure these nutrients are applied so they are efficiently used and not washed away into the water. Such techniques as applying at the appropriate time, placing nitrogen near the roots, and testing the soil to use the proper amount help aid the efficient use of these nutrients. The farmer saves money by using less nutrients. This helps keep the prices down. Therefore, people can eat more vegetables and fruits which are good for them.
4. From your discussion, brainstorm possible topics for posters. Such ideas as "Eat More Fruits and Vegetables," "Use Pesticides Properly," to "Chemicals Help Us Grow Better Food" might be used. The students could draw, paint, or use pictures from magazines to create their posters. Then display them at a classroom crop protection fair. Younger students may attend the fair. Students in your class can educate the younger students by describing their posters.

Discussion Questions:

1. Why do we use pesticides and fertilizers?
2. What could happen if pesticides were never used?
3. What kinds of foods can we grow an adequate supply of by using crop protection products?
4. How can we make our food safer?

Related Activities:

1. Take your class to an organic food store and regular food store. Compare prices and quality. Discuss the differences in price and quality. (Note: Some grocery stores do carry both organic and regularly processed foods, so you may be able to go to one store.)
2. Go to a nursery or garden center. Ask them to show the class the various pesticides and herbicides they use and why. Ask them to read the label for safety instructions. These labels are there to ensure safe usage for both the person handling the chemical and the environment.

Gear Up for Farming

Grade Level: 4-6

Approximate Length of Activity: 45 minutes

Objectives:

Teacher:

1. Allow students to make observations about gears through experimentation.
2. Teach students about the mechanics of gears (speed, torque, and rotation) using a hands-on activity.
3. Tell students how gears are used for farm machinery and allow them to research the mechanics of farm machines.

Students:

1. Make observations about gears.
2. Name machines in which gears are found.
3. Learn about speed, rotation, torque, and the use of gears on farms.
4. Show an understanding of gears by reporting on farm machinery.

Illinois Learning Standards: 3.A.2; 11.A.2b; 11.A.2e

Introduction:

Gears are wheels with teeth. You may have seen gears on bicycles, clocks, and cars. The teeth on gears allow one wheel to turn another wheel. Sometimes gears are next to each other and sometimes they are connected with chains, such as on a bike. Gears are also found on farm machinery. There are many types of gears. Some examples are helical, herringbone, bevel, worm, planetary, and rack-and-pinion gears.

Gears are used to transfer rotating motion and power from one part of a machine to another. If a large gear with 20 teeth is connected to a smaller gear with five teeth, one turn on the large gear turns the small gear four times. The ratio of the number of teeth on a small gear compared to the large gear it works with determines the speed that the small gear rotates and the amount of torque, or rotational force, it transmits. If a small gear drives a large gear, the speed will reduce but the torque will increase. However, if the large gear drives the small gear, the speed will increase but the torque will decrease.

Torque is power. You may have noticed on a bicycle that sometimes it is easy to move the pedals, but you must pedal many times to move far. This is because the gear arrangement causes the bike to have speed, but not much torque, or power. The gear ratio is low so each pedal takes you a small distance. You will only get to your destination quickly if you pedal fast many times. On the other hand, sometimes it is hard to move bicycle pedals but you go far with just a few pedal rotations. This is because the gear arrangement causes the bike to have a lot of torque (power) but not much pedal speed. The gear ratio is large so each pedal takes you a long distance. You will only get to your destination quickly if you have enough strength to move the pedals.

Materials Needed:

- "Gears" pattern
- Construction paper
- Scissors
- Brass fasteners
- Bicycle (optional)

Activity Outline:

1. Pass out the "Gears" pattern to each student in class. Have the students cut out the patterns and trace the gears onto construction paper. Cut the gears out of the construction paper. With brass fasteners, fasten the gear patterns to the corresponding construction paper gear. Label one gear "A" and one gear "B." Fold up the teeth on gear "B" and interlock gear "B" with gear "A."
2. Let the students play with their gears for a few minutes.
3. Ask the students for their observations. As they talk about their observations, discuss clockwise and counterclockwise rotation, speed, torque, the number of teeth on gears, and the ratio of teeth between gears that work together. Did the students realize that turning a large gear connected to a small gear increases the speed but decreases the torque? (and vice versa)
4. Show the students how to set up a series of gears and determine if the speed and torque will increase or decrease.
5. Talk to the students about machines they might be familiar with that use gears, such as bicycles and clocks. When tractors are in a low gear, they can do a lot of work or carry a heavy load because the power is great, but the speed is low. In cars, people start driving in a low gear but move to the higher gears as they need more speed.
6. To demonstrate the use of gears, ask another adult to ride a bicycle in front of the class. You may want to go outside or to the gymnasium for this demonstration. Ask the volunteer to start riding the bike in first gear. Ask the volunteer if it is easy or hard to pedal and if the bike has a lot or a little torque. Have the volunteer explain to the students what riding a bike in first gear is like. Ask the volunteer to move into the higher gears, one by one, and ask the same questions about pedaling and torque.

7. Tell the students to research one type of farm machinery. They should choose a machine that uses gears, draw a picture of how it works, and write a paragraph about the importance of gears in their machine.

Discussion Questions:

1. How do gears work and what do they do?
2. Should a person put a machine in low gear or high gear when they need speed?
3. If a person needed power (torque) and not speed, should they put a machine in low gear or high gear?
4. What are some machines that use gears?

Related Activities:

1. Create a timeline of farm machinery. When was each machine invented and how has it improved?
2. Interview an agriculture engineer. What types of improvements do they make on farm machinery?
3. Try to create a model of a farm machine using Legos™ with gears.

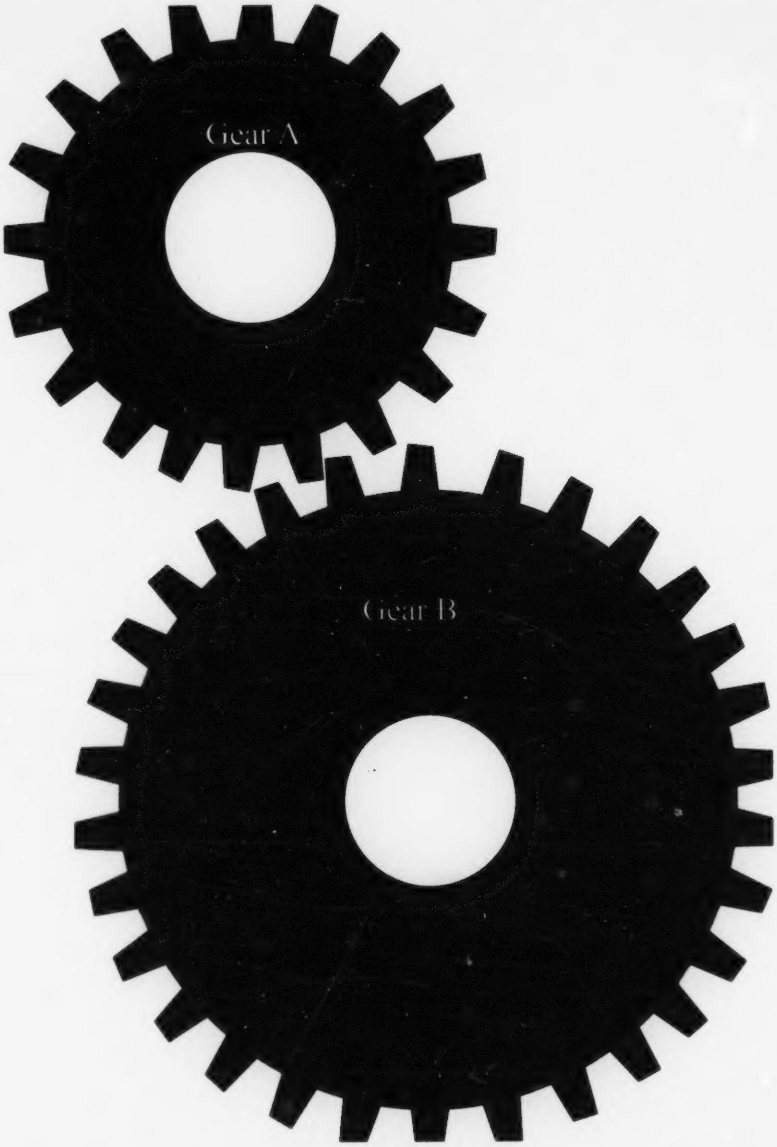
Other Resources:

1. *A Tractor Goes Farming* by Roy Harrington.
2. *Tractor Trouble* by Steve Augarde.
3. *How Gears Work*: www.howstuffworks.com gears.htm

To be used with:
Gear Up For Farming

Pattern

Gears


Gear A
Gear B

Buy, Sell, Trade, or Starve

Grade Level: 4-6

Approximate Length of Activity: One to two class periods

Objectives:

Teacher:

1. Use the USDA Food Guide Pyramid, science books, health books, and other resources to teach students about the importance of the food groups to our bodies.
2. Teach the students about imports and exports in the United States by using examples.
3. Facilitate a world-wide trading game in which students make decisions about buying and selling commodities.

Students:

1. Show an understanding of the USDA Food Guide Pyramid by naming the food groups and their importance to our bodies.
2. Learn the terms "import" and "export."
3. Name some imports and exports of the United States.
4. Participate in a game in which they assess their country's commodities and make fair trades with other countries.

Illinois Learning Standards: 15.A.2a; 15.B.2a; 15.B.2b; 15.B.2c; 15.C.2a; 15.C.2b; 15.D.2a; 22.A.2b; 23.B.2

Introduction:

Not all of the products we need to live comfortably are produced in our state or even our country. Trade and marketing are very important to American agriculture. U.S. farmers grow much of the food that feeds the world. Sales of U.S. commodities to Japan, the European countries, Canada, and Mexico help to make America the largest exporter of agricultural commodities in the world.

Sales of value-added products such as processed or packaged foods to other countries from the U.S. are increasing each year. Frozen vegetables and boxed cereal from the U.S. can now be found in supermarkets around the world.

American consumers have also developed a taste for some things that cannot easily be grown in our country, such as certain spices, coffee, tea, cocoa, and bananas. Imports also vary according to the season. Something that can be grown in the U.S. during one part of the year but not throughout the entire year is often imported during the off-season. This primarily includes certain fresh fruits and vegetables. Occasionally, an agricultural product such as sugar will be imported to the U.S. in its raw form and then processed and packaged in America.

Our bodies need foods from each of the food groups in the Food Guide Pyramid to stay healthy. Grains provide our bodies with the carbohydrates we need for energy. Vegetables give our bodies vitamin A and fiber. Fruits are great for vitamin C and fiber. Meats give our bodies protein, iron, zinc, and vitamin B_{12}. Dairy products provide calcium for healthy bones and teeth. The foods in the "others" category do not have enough nutrients to fit in any group, but it is okay to eat these foods occasionally.

Materials Needed:

- "Buy, Sell, Trade, or Starve" playing cards
  - 10 MILK, YOGURT, CHEESE cards worth $5 each
  - 15 VEGETABLE cards worth $10 each
  - 10 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS cards worth $15 each
  - 10 FRUIT cards worth $20 each
  - 30 BREAD, CEREAL, RICE, PASTA cards worth $25 each
  - 5 FAT, OIL, SWEET cards worth $30 each

Activity Outline:

1. Review the USDA Food Guide Pyramid and discuss the importance of each category. Discuss the nutritional value of each food group to our bodies. What would our bodies lack if we didn't eat from a certain food group?
2. Explain that not every country is able to grow all of the foods necessary to feed its people. It is important to stress that all people in the world need the same food nutrients to stay healthy and strong—no matter what country they live in. Discuss with the students the concepts involved in world trade such as "supply and demand" and "importing and exporting." Be sure to tie in the importance of climate and technology in determining a country's ability to produce agricultural products and import and export.
3. Divide the class into five teams with each team naming itself after a country. When all teams have selected their country name, have one of the students list the teams on the board in alphabetical order—this will determine the order each round will take.
4. Take the set of "Buy, Sell, Trade, or Starve" playing cards. Mix the cards up and place them face down in one or more stacks. Ask each team to pick a representative to draw cards (straight off the top), look at them and continue drawing cards until they have acquired a total of $290 worth of cards. The team members should add the numbers as the cards are selected. (If their last

draw puts them over $290, they must return the drawn card to a "discard" stack until they have cards valued at exactly $290.)

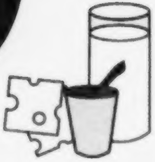
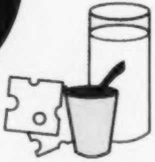
5. Have the students compare their cards to the food pyramid diagram. The pyramid consists of minimum servings of:
   - 2 servings of milk, yogurt, cheese
   - 3 servings of vegetables
   - 2 servings of meat, poultry, fish, dry beans, eggs, nuts
   - 2 servings of fruit
   - 6 servings of bread, cereal, rice, pasta
   - 1 serving of fat, oil, sweets
6. Ask the students to determine what types of foods and the number of servings they need to complete their food pyramid. Each team will have too many servings of some food groups and not enough servings of other food groups.
7. Ask the students to place the cards they do not need to complete their pyramid face up so they can cooperate with other countries that are needing to "import" those food products. These cards that are face up are called "Export" cards. Point out that one team's "Export" cards become another teams "Import" cards.
8. Starting with the first team, have them say, "We would like to import ___________ valued at $______ and we are able to export _____________ at the same value." (All trades must be of equal value. Example: two milk, yogurt, cheese cards equal the price of one vegetable card.)
9. Continue the rounds until one team gets all of the cards needed to complete its food pyramid and exports all of its extra products. (The team has no "Export" cards left and no longer needs to import food products.) The class may want to continue trading until all teams acquire the needed food products.

Discussion Questions:

1. What is the USDA Food Guide Pyramid and how is each of the food groups important to our bodies?
2. What do import and export mean?
3. What types of things does the United States import from other countries? What do we export?
4. Why would the U.S. export items to other countries?
5. Why would the U.S. import items from other countries?

Related Activities:

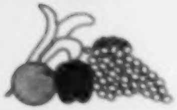
1. "Connecting to Agriculture," produced by Illinois Farm Bureau®, is a video for intermediate and early secondary grades, focusing on corn, cotton, apples, dairy, and soybeans while interweaving topics of biodegradable properties, renewable resources, biotechnology, foreign trade, pest management, conservation practices, and food quality. Contact your county Farm Bureau® to obtain a copy for your classroom.
2. Use *Ag Mag* 3, produced by the Illinois Farm Bureau®, to teach your students more about nutrition and the food guide pyramid. Contact your county Farm Bureau® to obtain copies to use in your classroom.

$5 MILK, YOGURT, CHEESE	$5 MILK, YOGURT, CHEESE	$5 MILK, YOGURT, CHEESE	$5 MILK, YOGURT, CHEESE
$5  MILK, YOGURT, CHEESE	$5 MILK, YOGURT, CHEESE	$5 MILK, YOGURT, CHEESE	$5 MILK, YOGURT, CHEESE
$5  MILK, YOGURT, CHEESE	$5 MILK, YOGURT, CHEESE	$10 VEGETABLE	$10 VEGETABLE

To be used with:
Buy, Sell, Trade, or Starve

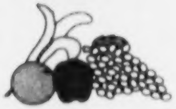
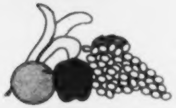
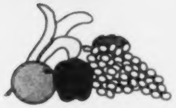
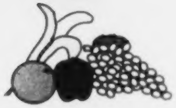
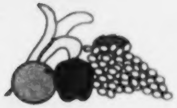
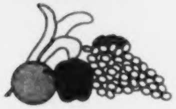
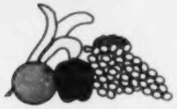
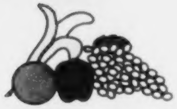
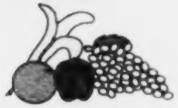
$10 VEGETABLE	$10 VEGETABLE	$10 VEGETABLE	$10 VEGETABLE
$10 VEGETABLE	$10 VEGETABLE	$10 VEGETABLE	$10 VEGETABLE
$10 VEGETABLE	$10 VEGETABLE	$10 VEGETABLE	$10 VEGETABLE

Playing Cards

$10 VEGETABLE	$15 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS	$15 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS	$15 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS
$15 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS	$15 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS	$15 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS	$15 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS
$15 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS	$15 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS	$15 MEAT, POULTRY, FISH, DRY BEANS, EGGS, NUTS	$20  FRUIT

To be used with:
Buy, Sell, Trade, or Starve

WS-336

$20  **FRUIT**	**$20**  **FRUIT**	**$20**  **FRUIT**	**$20**  **FRUIT**
$20  **FRUIT**	**$20**  **FRUIT**	**$20**  **FRUIT**	**$20**  **FRUIT**
$20  **FRUIT**	**$25** **BREAD, CEREAL, RICE, PASTA**	**$25** **BREAD, CEREAL, RICE, PASTA**	**$25** **BREAD, CEREAL, RICE, PASTA**

Playing Cards

$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA
$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA
$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA

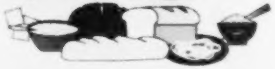
To be used with:
Buy, Sell, Trade, or Starve

WS-338

$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA
$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA
$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA	$25 BREAD, CEREAL, RICE, PASTA

To be used with:
Buy, Sell, Trade, or Starve

$25



BREAD, CEREAL, RICE, PASTA

$25

BREAD, CEREAL, RICE, PASTA

$25

BREAD, CEREAL, RICE, PASTA

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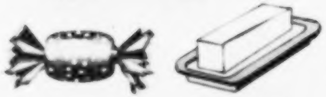

FATS, OILS, SWEETS

$30

FATS, OILS, SWEETS

$30

FATS, OILS, SWEETS

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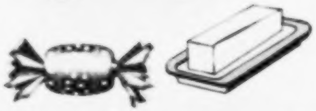


FATS, OILS, SWEETS

$30

FATS, OILS, SWEETS

Looking Into Your Future

Grade Level: 4-6

Approximate Length of Activity: Two to three class periods

Objectives:

Teacher:

1. Help students research material on careers in the areas of health, nutrition, and safety.
2. Supply materials for the students to create a vest to model their career.
3. Provide ideas where students might write or contact someone for information.

Students:

1. Brainstorm careers in agriculture.
2. Research a chosen career dealing with agriculture in respects to health, nutrition, and safety.
3. Design and model a paper vest to tell class members about their occupation.

Illinois Learning Standards: 4.A.2b; 13.B.2f; 22.B.2

Introduction:

Of all the careers available to today's young people, none is more vital to the future of the world than a career in agriculture. It is important to understand that agriculture as we know it today has taken on a broader meaning. It now includes areas such as finance, research, education, communications, engineering, and conservation, along with those who cultivate the land to raise crops and raise livestock. It is also a term that encompasses the manufacturing and distribution of farm equipment and supplies and the processing, storage, and distribution of farm commodities. The new word coined for today's agriculture is agribusiness.

Agribusiness is the largest single industry in the United States and one that is getting bigger all the time. As the population grows, the agricultural industry increases to meet the increased demands for foods and fibers. At the same time, the introduction of new products and methods adds to the industry's diversity.

Agricultural careers are any career that involves food, fiber, flowers, and/or forestry. The planting, growing, harvesting, storing, transporting, making, processing, selling, and buying of food and fiber are all part of agriculture. Careers such as food scientists, clothing store salespersons, restaurant owners, teachers that teach about plants and animals, and agriculture reporters are all careers related to agriculture.

The agriculture industry is made up of many sectors of careers. Many of the careers involve health, nutrition, or safety. Dietitians help others learn how to eat properly and take care of their bodies. Safety Inspectors make sure that agricultural businesses are safe and comply with safety laws. Meat Inspectors make sure that quality, healthy meat is available to consumers. All of these are health, nutrition, and safety careers in agriculture because they deal with food and/or fiber.

Some careers in health, safety, and nutrition are:

Animal Cytologist
Animal Geneticist
Animal Nutritionist
Animal Scientist
Bacteriologist
Biochemist
Botanist
Dairy Nutrition Specialist
Embryologist
Entomologist
Food Chemist
Hydrologist
Marine Biologist
Microbiologist
Organic Chemist
Parasitologist
Pharmaceutical Chemist
Plant Cytologist
Plant Ecologist
Plant Geneticist
Plant Nutritionist
Plant Pathologist
Veterinarian
Veterinary Pathologist
Virologist
Food Processing Supervisor
Food and Drug Inspector
Meat Inspector
Milk Plant Supervisor
Quality Control Supervisor
Ag Safety Engineer
Safety Inspector
Insect and Disease Inspector
Ag Extension Agent
Food Scientist
Agronomist
Food Engineer
Nutritionist
Water Quality Specialist
Nutrition Counselor
Restaurant Manager
Dietitian

Materials Needed:

- Blackboard or overhead
- Chalk or overhead marker
- Brown grocery sacks (one for each student)
- Crayons or markers
- Scraps of construction paper
- Old magazines
- Glue
- Scissors
- Research materials or use of the Internet

Activity Outline:

1. Begin with discussing what agriculture is and what it encompasses. Ask the students if they know that agriculture involves everything that deals with food, forestry, flowers, and fiber. (Fiber is cotton, wool, etc.) The planting, growing, harvesting, storing, transporting, making, processing, selling, and buying of food, fiber, forestry, and flowers are all part of agriculture. There are many careers that sometimes are not thought of as agricultural careers.

2. Next, move the discussion to talk about health, nutrition, and safety careers in agriculture. Ask the students to think of agricultural careers that are also health, nutrition, and safety careers. Refer to the list of careers found in the introduction of this lesson.
3. Ask the students to each choose an agricultural career that is in the health, nutrition, or safety field. The students should research their career to find out what that person does and what type of education is needed. They can do this through encyclopedias, the Internet, career books or brochures, and/or guidance counselors. The students may also want to write to universities or community colleges for any information they have on a certain career.
4. After the research is conducted, let each student create a vest from a paper bag to demonstrate what he or she would do in their chosen career. The students can use magazine cut-outs, crayons, and markers to show what he or she does. The students can also include skills on their vest that they would need to have.
5. Set aside time for the students to stand, wearing their vests, and tell their classmates about the occupation they have selected.
6. The vests can be put on display for others to see in order to learn about careers or a "career show" could be given to other classrooms.

Discussion Questions:

1. What is agriculture?
2. What careers do you know about that would deal with agriculture, especially in the areas of health, nutrition, and safety?
3. Why are health, nutrition, and safety so important to us as consumers?
4. Did you learn about a career that you might be interested in for an occupation?

Related Activities:

1. Invite visitors in agriculture careers to visit the classroom to speak about what they do for a living.
2. Visit a college or university where agriculture classes are taught.
3. Research other agriculture careers.
4. Conduct an interview of someone who works in an agricultural career and videotape the interview to show to others.
5. Create a poster that shows how safety and health factors are important in the career you choose.
6. Make a bumper sticker that tells others about your career.

Soy Amazing

Grade Level: 4-6

Approximate Length of Activity: One hour

Objectives:

Teacher:

1. Help students realize how they use soybean products every day and that agriculture is important to our lives.
2. Explain how soybeans are nutritionally valuable, and assist students in making soy flour and ginger cookies.

Students:

1. Understand the value of soybeans to our world and Illinois.
2. Use research skills to develop a list of stores which may carry soy flour.
3. Demonstrate understanding the importance of protein, carbohydrates, vitamins, minerals, and dietary fiber by explaining how cookies made with soybeans are useful to our bodies.
4. Name the parts of a soybean and understand the importance of each part.

Illinois Learning Standards: 12.A.2a; 13.B.2c; 22.A.2b

Introduction:

More soybeans are grown in the United States than anywhere else in the world. In 1998, Illinois farmers grew 469,000,000 bushels of soybeans. Illinois ranks second in soybean production among other states. Approximately 10,700,000 acres of Illinois land are used for soybean growth.

Soybeans are the most widely eaten plant in the world! They contain protein, carbohydrates, vitamins, minerals, and oil. Soybeans are high in dietary fiber and supply all of the amino acids (protein) needed for human health. Soy protein foods may cut heart disease risk by 25 to 30 percent if eaten as a regular part of a diet low in saturated fat and cholesterol. Studies suggest soy may also cut the risk of osteoporosis and fractures in later years of life by increasing bone density. Soy products may also fight cancer through a unique chemical called genistein which suppresses the growth of cancer cells.

In processing, the soybeans are cleaned, cracked, dehulled, and rolled into flakes. This ruptures the oil cells for efficient extraction of the soy oil. After removal of the soybean oil, the remaining flakes can be processed into various edible soy protein products or used to produce protein meal for animal feeds.

The dry, solid portion of the bean provides many edible products. Soy flours and grits are used in the commercial baking industry. Soy hulls are processed into fiber-bran breads, cereals, and snacks. Soybean oil finds its way into such products as margarine, salad, and cooking oils.

Soy flour is the fine powder produced by grinding soybeans. It is an inexpensive, cholesterol-free egg substitute for baked goods. You can make your own soy flour and use it in recipes that call for flour. Blend a half-cup of cleaned dry soybeans in a blender until the particles are fine. Since no preservatives are used, you should freeze the extra flour that will not be used in the next few weeks.

Each year's soybean crop develops from soybean seed. The seed contains a seedling (young plant) and food for it. The main parts of the soybean seed are:

Hilum—the part of the seed where it was once attached to the pod. The hilum is often black or brown but is yellow on some varieties.

Seed Coat—a thin covering that protects the seed.

Cotyledon—the part of the seed in which food for the seedling is stored. Each bean has a pair of cotyledons forming a protective shield around the seedling.

Epicotyl—the uppermost part of the seedling. It has two leaves that are unifoliated (containing only one leaflet). These are the first true leaves to develop on the plant.

Hypocotyl—the lower portion of the seedling's stem.

Radicle—the main root of the seedling. It takes up water and nutrients from the soil to nourish the seedling.

Materials Needed:

- "Main Parts of the Soybean Seed" handout
- Dry soybeans
- Oven
- Measuring cups and spoons
- 3/4 cup margarine
- 1 cup brown sugar
- 1 egg
- 1/4 cup molasses
- 3 tablespoons milk
- 2 1/4 cups soy flour (homemade – directions in Activity Outline)
- 2 teaspoons baking powder
- 1 teaspoon cinnamon
- 1 1/4 teaspoon ginger
- 1/2 teaspoon cloves
- 1/2 teaspoon salt
- Granulated sugar for tops

Activity Outline:

* Contact your county Farm Bureau to help obtain soybeans.

1. Discuss soybean production in Illinois and the uses of soybeans.
2. Discuss the nutritional benefits of soybeans to our bodies.
3. Look at the "Main Parts of the Soybean Seed" handout. Ask the students to name the parts and what they do for the soybean plant.
4. Make soy flour by blending dry soybeans in a blender until particles are fine. Keep blending soybeans until you have two-and-one-fourth cups of soy flour.
5. Make ginger cookies with your soy flour.
   - a. Mix together the margarine, brown sugar, egg, molasses, and milk.
   - b. Blend in soy flour, baking powder, cinnamon, ginger, cloves, and salt.
   - c. Drop dough by teaspoon on a lightly oiled baking sheet.
   - d. Bake at 350°F for 12 minutes or until set. Don't over-bake.
   - e. Sprinkle each cookie with granulated sugar.
   - f. Remove from baking sheet. Makes about four dozen cookies.
   - g. Eat the cookies after the students name the ways the soy ginger cookies are nutritional.

Discussion Questions:

1. What are some uses for soybeans?
2. How is soy flour made?
3. What are the parts of a soybean?
4. What nutritional value do soybeans have?

Related Activities:

1. Use *Ag Mag* 10, "Imagine a Bean . . .It's the Coolest Thing," from the Illinois Farm Bureau® to make crayons from soybeans.
2. Grow soybeans in your classroom. Talk about the parts of a soybean plant and how they grow. Chart the plant growth.
3. Make soynuts using the instructions in *Ag Mag* 10, "Imagine a Bean...It's the Coolest Thing."
4. Study George Washington Carver, who discovered that soybeans have valuable protein and invented many uses for them.
5. Use soybean plants to study root growth, transpiration, evaporation, and light.

Other Resources:

1. *Ag Mag* 10, "Imagine a Bean... It's the Coolest Thing," an educational magazine for classrooms. Contact your county Farm Bureau® for information about obtaining *Ag Mags* for your classroom.
2. "Soybeans: The Miracle Crop" kit for grades 4-6, Illinois Soybean Association, Illinois Soybean Checkoff Board, 1605 Commerce Parkway, Bloomington, IL 61704, (309) 663-SOYA.
3. The Indiana Soybean Kit, available for loan from many county Farm Bureaus®.
4. "The Soybean Solution," Nebraska Soybean Association, 301 Centennial Mall So., Fourth Floor, Box 95144, Lincoln, NE 68509.
5. "Captain Soybean and his Protein Potent Pals Wonder Book," Illinois Soybean Association, Illinois Soybean Checkoff Board, 1605 Commerce Parkway, Bloomington, IL 61704, (309) 663-SOYA.
6. "The Miracle Crop . . .SOYBEANS," A brochure from the Illinois Soybean Association and the Illinois Soybean Checkoff Board, 1605 Commerce Parkway, Bloomington, IL 61704, (309) 663-SOYA.

7. *Why the Brown Bean was Blue* by Susan M. Pankey, Nebraska Ag in the Classroom, 5225 S. 16th St., Lincoln, NE 68512, (402) 421-4400.
8. "Where's Bennie?" Coloring Book, Indiana Soybean Development Council, 423 West South Street, Lebanon, Indiana, 46052, (317) 482-4376.
9. Ag in the Classroom Video Lesson Plans on Soybeans featuring "Sandy Soybean," North Carolina Farm Bureau® & North Carolina Soybean Producers Association, P.O. Box 27755, Raleigh, NC 27611, (919) 783-4326 or (919) 782-1705.
10. "Soy McCoy Coloring Book," Ohio Soybean Council, P.O. Box 479, Columbus, Ohio 43216.
11. "The Magic Bean: A Look at the Versatile Soybean," "Look Where Soybeans Go," brochures from Archer Daniels Midland Company, Box 1470, Decatur, Illinois 62525, (217) 424-5200, http://www.admworld.com.
12. "1995 Soy Stats," A reference guide, American Soybean Association, P.O. Box 419200, St. Louis, MO 63141-9200, (314) 576-1770.
13. Illinois Soybean Association, Illinois Soybean Checkoff Board: www.ilsoy.org/.
14. American Soybean Association: www.oilseeds.org/asa/.
15. Soybean Statistics: www.ag.uiuc.edu/~stratsoy/96soystats/pg2.html.

To be used with:
Soy Amazing Name ____________________

Main Parts of the Soybean Seed

Hilum - point of attachment between seed and pod.

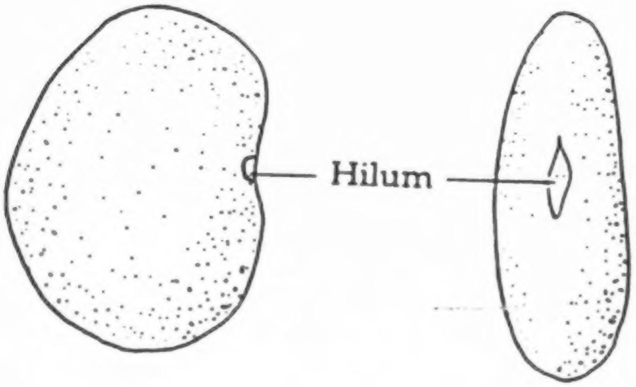
Hypocotyl - forms the stem below the cotyledon.

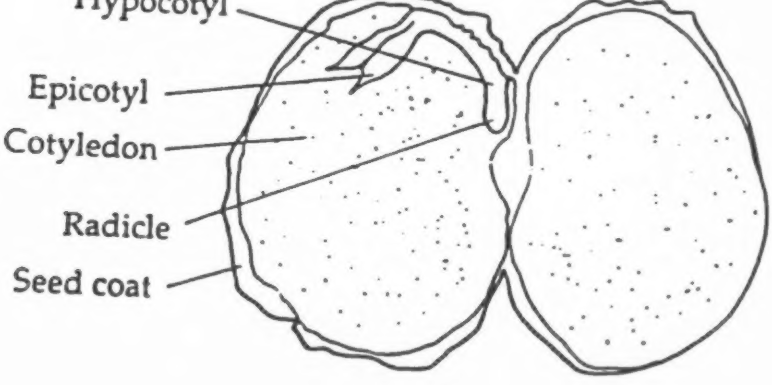
Epicotyl - growing point of plant, and forms the stem of the plant.

Cotyledon - stores food for embryo plant.

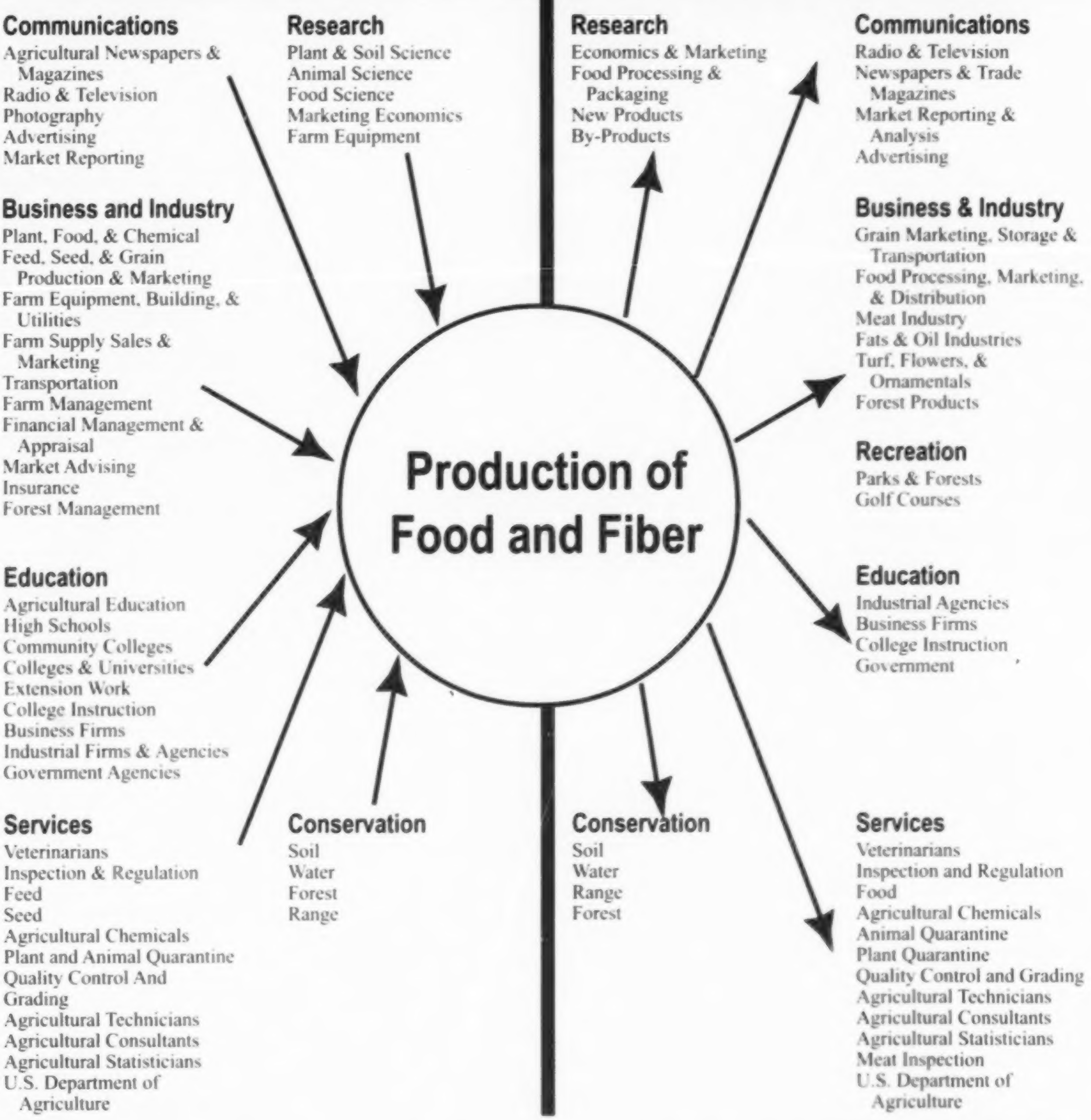
Radicle - forms the primary root.

Seed Coat - protects embryo from insects, disease, and damage.




Hypocotyl
Epicotyl
Cotyledon
Radicle
Seed coat

Career Opportunities in Food and American Agriculture



Careers Involved in Serving and Producing for Farmers

Careers in Marketing, Processing, Packaging, and Distributing Agricultural Products Serving the Consumer

Production of Food and Fiber

Communications
- Agricultural Newspapers & Magazines
- Radio & Television
- Photography
- Advertising
- Market Reporting

Research
- Plant & Soil Science
- Animal Science
- Food Science
- Marketing Economics
- Farm Equipment

Business and Industry
- Plant, Food, & Chemical
- Feed, Seed, & Grain Production & Marketing
- Farm Equipment, Building, & Utilities
- Farm Supply Sales & Marketing
- Transportation
- Farm Management
- Financial Management & Appraisal
- Market Advising
- Insurance
- Forest Management

Education
- Agricultural Education
- High Schools
- Community Colleges
- Colleges & Universities
- Extension Work
- College Instruction
- Business Firms
- Industrial Firms & Agencies
- Government Agencies

Services
- Veterinarians
- Inspection & Regulation
- Feed
- Seed
- Agricultural Chemicals
- Plant and Animal Quarantine
- Quality Control And Grading
- Agricultural Technicians
- Agricultural Consultants
- Agricultural Statisticians
- U.S. Department of Agriculture

Conservation
- Soil
- Water
- Forest
- Range

Research
- Economics & Marketing
- Food Processing & Packaging
- New Products
- By-Products

Communications
- Radio & Television
- Newspapers & Trade Magazines
- Market Reporting & Analysis
- Advertising

Business & Industry
- Grain Marketing, Storage & Transportation
- Food Processing, Marketing, & Distribution
- Meat Industry
- Fats & Oil Industries
- Turf, Flowers, & Ornamentals
- Forest Products

Recreation
- Parks & Forests
- Golf Courses

Education
- Industrial Agencies
- Business Firms
- College Instruction
- Government

Conservation
- Soil
- Water
- Range
- Forest

Services
- Veterinarians
- Inspection and Regulation
- Food
- Agricultural Chemicals
- Animal Quarantine
- Plant Quarantine
- Quality Control and Grading
- Agricultural Technicians
- Agricultural Consultants
- Agricultural Statisticians
- Meat Inspection
- U.S. Department of Agriculture

Careers in Agriculture

Agricultural and Consumer Economics

Agricultural Economics

Job Titles	Prospective Employers	Employer Examples
Commodity broker	Accounting firms	Cargill, Inc.
Credit examiner	Chemical companies	Chicago Board of Trade
Farm and land appraiser	Commercial bank institutions	Continental Grain
Food store manager	Federal agencies	Dow Elanco
Marketing advisor	Food manufacturers	Farm Credit Services
Professional farm manager	Grain companies	Illinois Farm Bureau®
Sales representative	Insurance companies	Marine Bank of Springfield
Marketing services		USDA Statistical Reporting Service

Consumer Economics

Job Titles	Prospective Employers	Employer Examples
Claims analyst	Brokerage firms	Better Business Bureau
Consumer advisor	Financial institutions	The Brokers
Consumer services director	Government agencies	Extension Service
Customer assurance	Law firms	Commercial National Bank
Insurance agencies analyst		International Diners Club
Financial counselor		Financial Network Investment Corp.
Financial planner		
Personnel assistant		

Marketing of Textiles and Apparel

Job Titles	Prospective Employers	Employer Examples
Area sales manager	Direct marketing companies	Benetton
Assistant product manager	Retail establishments	Carson Pirie Scott and Co.
Customer site representative	Textile, fabric, and apparel manufacturers	I Magnin
Financial analyst		Liz Claiborne
Manufacturing representative		Marshall Fields and Co.
Quality assurance inspector		Spiegel
Sales training coordinator		Talbots
Store manager		U. S. Shoe Corp.

Agricultural Engineering

Agricultural Engineering/ Technical Systems Management

Job Titles	Prospective Employers	Employer Examples
Drainage engineer	Building products companies	Caterpillar
Environmental engineer	Farm equipment manufacturers	Deere and Co.
Food engineer	Food processors	Moorman Manufacturing Co.
Machine design engineer	Machinery manufacturers	Morton Buildings
Product manager		Spraying Systems, Inc.
Technical salesperson		
Technical systems manager		

Animal Sciences

Animal Sciences

Job Titles	Prospective Employers	Employer Examples
Animal health product salesperson	Animal health firms	Abbot Labs
Dairy equipment specialist	Commercial feed lots	A.M.P.I.
Feed salesperson/manager	Federal agencies	Cargill, Feed Division
Food/meat product development supervisor	Feed companies	Eli Lilly and Co.
Livestock marketing specialist	Marketing/commission firms	Excel
Livestock production manager	Private research firms	Illinois and National Pork Producers
-beef -dairy	Purebred breed associations	Moorman Manufacturing Co.
-poultry -sheep	Veterinary suppliers	Purina Mills, Inc.
-swine		
Research and lab technician		

Crop Sciences

Crop Sciences

Job Titles

- Crop production consultant
- Research and laboratory technician
- Plant manager
- Agroecologist
- Chemical research and development personnel
- Land use planner
- Seed technologist
- Systems specialist

Prospective Employers

- Precision crop managers
- Crop production contractors
- Agricultural services
- Farm management
- Government agencies
- Banks
- Universities
- Private consultants

Employer Examples

- Pioneer Seed Company
- Illinois Department of Agriculture
- Crop Protech
- Farmland Industries
- Illinois Foundation Seeds
- John Deere, Inc.
- FS Cooperatives
- Novartis

Food Science and Human Nutrition

Dietetics

Job Titles

- Clinical nutrition specialist
- Corporate nutritionist
- Dietitian
- Exercise physiologist
- Food service manager
- Nutrition educator
- Wellness coordinator

Prospective Employers

- Athletic teams
- Public health districts
- Clinics
- Fitness centers
- Nursing homes
- Pharmaceutical companies

Employer Examples

- Carle Clinic
- C.H. Health Technologies
- Hines V.A. Hospital
- Marriott Corporation
- Parkside Sport and Fitness Center
- Sysco Food Services

Food Industry and Business

Job Titles

- Food broker
- Food editor
- Food stylist
- Production development manager
- Sales representative
- Test kitchen manager

Prospective Employers

- Food and appliance manufacturers
- Food processing corporations
- Food wholesale brokers
- Ingredient companies
- Magazine and book publishers
- Restaurants and food services

Employer Examples

- Backas Communications
- Better Homes and Gardens
- Federated Foods
- Kraft General Foods
- Meadow Gold
- OSI Industries

Food Science

Job Titles

- Food chemist
- Food manufacturing technician
- Food microbiologist
- Food product research and development coordinator
- Quality assurance technician
- Starch processing companies

Prospective Employers

- Commercial labs
- Dairy product companies
- Food processing and manufacturing

Employer Examples

- Dean Foods
- General Mills
- Kraft companies
- The Quaker Oats Company
- Mars, Inc.

Hospitality Management

Job Titles

- Food & beverage director
- Assistant manager
- Account executive
- Operations manager
- Club house manager
- General manager

Prospective Employers

- Hotels
- Restaurants
- Food distributors
- Theme parks
- Country clubs
- Gaming operations

Employer Examples

- Hyatt Hotels
- Lettuce Entertain You
- Sysco
- Disney World
- Aurora Country Club

Human Nutrition

Job Titles

- Consumer foods specialist
- Educator
- Flavor technician
- Nutrition coordinator
- Public health nutritionist
- Sensory specialist
- Test kitchen product development
- Weight consultant

Prospective Employers

- Equipment companies
- Food manufacturing firms
- Government agencies
- Medical and dental centers
- Trade and commodity associations

Employer Examples

- Concept Food Brokers
- Extension Service
- EFNEP
- Gerber Products Co.
- Jenny Craig Weight Loss Centers
- National Dairy Council
- Nutra Sweet
- Proctor and Gamble

Human and Community Development

Agricultural Communications

Job Titles

Agricultural advertising specialist
Farm radio-TV broadcaster
Market news reporter
Photographer
Public relations representative

Prospective Employers

Advertising agencies
Broadcasting companies
Newspapers
Public relations companies
Publishing companies

Employer Examples

Gibbs and Soell, Inc.
Illinois Agri-News
Pioneer Hi-Bred International
Prairie Farmer
WMBD-TV

Agricultural Education

Job Titles

Educational specialist
Extension educator
Sales representative
Teacher

Prospective Employers

AgriBusiness firms
Community colleges
Government agencies
Secondary schools

Employer Examples

Community colleges
Extension Service
Illinois secondary schools

Human Development and Family Studies

Job Titles

Adoption counselor
Child life specialist
Extension educator
Day-care licensing representative
Early intervention specialist
Family/child caseworker
Family life specialist
Volunteer service director
Youth service worker

Prospective Employers

Adoption centers
Child care resource and referral
Corporate day-care centers
Early childhood intervention programs
Government agencies
Public schools
Private agencies
Substance abuse centers

Employer Examples

American Academy of Pediatrics
Big Brother/Big Sister programs
Catholic Social Services
Department of Children and Family Services
Housing Authority
March of Dimes
Riley's Children's Hospital
Village Childcare, Inc.

National Resources and Environmental Sciences

Forestry

Job Titles

Biometrician
Forest and park ranger
Forest manager
Forest pathologist
Resource conservationist
Urban forester
Wood scientist

Prospective Employers

Forest trade associations
Furniture manufacturers
Local, state, and federal government agencies
Lumber companies
Nature centers
Outdoor experience centers

Employer Examples

Cook County Forest Preserves
Illinois Department of Conservation
International Paper Co.
U.S. Environmental Protection Agency
U.S. Forest Service
Weyerhauser

Horticulture

Job Titles

Floral shop manager
Fruit and vegetable grower
Garden center manager
Golf course superintendent
Interior plantscape designer
Landscape designer
Nursery owner
Seed and bulb marketing coordinator

Prospective Employers

Botanic gardens
Commercial fruit growers
Commercial lawn care companies
Garden centers
Golf courses
Park districts
Landscape contractors

Employer Examples

George J. Ball, Inc.
Burpee Seed Co.
Butler National Golf Club
Chicago Botanic Garden
Epcot Center
T. Brickman Co.
Greenview Nursery
Tru Green

Natural Resources and Environmental Sciences

Job Titles

Environmental educators/communicators/researchers
Social and environmental impact analysts
Ecologists
Biologists
Park/forest/rangeland managers
Natural Resources and Conservation officers
Nature center directors
Resource conservationists
Technical sales representatives
Fiber/textile managers and consultants
Non-profit organizations
Educational institutions

Prospective Employers

Federal, state and local government agencies:
U.S. Forest Service
U.S. Park Service
U.S. Environmental Protection Agency
State Departments of Safe Energy
Environmental Protection
Nature centers/outdoor experience centers
Natural resource magazine publishers

Employer Examples

Cook County Forest Preserve
Illinois Department of Conservation
Peace Corps
U.S. Forest/Park Service
National Wildlife Federation
Communication Council
Nature Conservancy
Marion Textile Co.
U.S. Army Construction Engineering Lab

Information taken from "Jobs To Start In, Careers To Grow In" brochure from ACES: College of Agricultural, Consumer, and Environmental Sciences at University of Illinois in Urbana-Champaign.

County Farm Bureaus®

COUNTY	PHONE	FAX	STREET	CITY
Adams	217-222-7305	217-222-7984	330 S. 36th St., PO Box 3037	Quincy, IL 62305-3037
Bond	618-664-3100	618-664-4777	925 E. Harris Ave., PO Box 256	Greenville, IL 62246-0256
Boone	815-547-7500	815-547-6470	702 W. Locust St.	Belvidere, IL 61008-4206
Brown	217-773-2634	217-773-3032	109 W. North St.	Mt. Sterling, IL 62353-1244
Bureau	815-875-6468	815-872-5809	State Rte. 34 East, PO Box 190	Princeton, IL 61356-0190
Calhoun	618-576-2233	618-576-2272	County Road, PO Box 386	Hardin, IL 62047-0386
Carroll	815-244-3001	815-244-3067	811 S. Clay St.	Mt. Carroll, IL 61053-9770
Cass-Morg.	217-245-6833	217-245-1569	1152 Tendick	Jacksonville, IL 62650-3149
Champaign	217-352-5235	217-352-8768	801 N. Country Fair Dr., Ste. A, PO Box 3098	Champaign, IL 61821
Christian	217-824-2940	217-824-2477	400 W. Market St.	Taylorville, IL 62568-2133
Clark	217-382-4144	217-382-5788	255 W. Cumberland, PO Box W	Martinsville, IL 62442-0468
Clay	618-665-3300	618-665-3345	Church St., PO Box E	Louisville, IL 62858-0905
Clinton	618-526-7235	618-526-2156	1165 N. 4th St., PO Box 126	Breese, IL 62230-0126
Coles	217-345-3276	217-345-3905	719 W. Lincoln Ave.	Charleston, IL 61920-2425
Cook	708-354-3276	708-579-6056	6438 Joliet Rd.	Countryside, IL 60525-4642
Crawford	618-544-3792	618-544-3067	1221 N. Allen St., PO Box 247	Robinson, IL 62454-0247
Cumberland	217-849-3031	217-849-2273	402 E. Main, PO Box 8	Toledo, IL 62468-0008
DeKalb	815-756-6361	815-756-3961	1350 W. Prairie Dr.	Sycamore, IL 60178-3166
DeWitt	217-935-2126	217-935-6840	Highway 54, West	Clinton, IL 61727-0517
Douglas	217-253-4442	217-253-3300	105 N. Main, PO Box 380	Tuscola, IL 61953-0380
DuPage	630-668-8161	630-668-4162	245 S. Gary Ave.	Carol Stream, IL 60188-2006
Edgar	217-465-8511	217-463-1663	210 W. Washington St.	Paris, IL 61944-1723
Edwards	618-445-2113	618-445-2117	15 S. 5th St.	Albion, IL 62806-1116
Effingham	217-342-2103	217-342-3853	1102 W. Evergreen, PO Box 569	Effingham, IL 62401-0569
Fayette	618-283-3276	618-283-4497	1125 N. Sunset Dr., PO Box 336	Vandalia, IL 62471-0336
Ford-Iroq.	815-265-4712	815-265-4274	Rt. 45 South, PO Box 309	Gilman, IL 60938-0309
Franklin	618-435-3616	618-439-2803	Rt. 3, PO Box 457	Benton, IL 62812-0457
Fulton	309-547-3011	309-547-2324	15411-A N. State Route 100	Lewistown, IL 61542-8905
Gallatin	618-272-3531	618-272-5800	Murphy Street, PO Box 250	Ridgway, IL 62979-0250
Greene	217-942-6958	217-942-9054	319 6th St.	Carrollton, IL 62016-1247
Grundy	815-942-6400	815-942-6418	4000 Division	Morris, IL 60450-9357
Hamilton	618-643-2348	618-643-2514	US Highway 14 East, PO Box 248	McLeansboro, IL 62859-0248
Hancock	217-357-3141	217-357-2236	71 S. Adams, PO Box 360	Carthage, IL 62321-0360
Henry	309-937-2411	309-937-3960	114 N. East Street	Cambridge, IL 61238-1157
Jackson	618-684-3129	618-687-4405	220 N. 10th St.	Murphysboro, IL 62966-2132
Jasper	618-783-2733	618-783-4226	Rte. 33 West, PO Box 329	Newton, IL 62448-0329
Jefferson	618-242-4510	618-242-7069	814 Harrison St., PO Box 927	Mt. Vernon, IL 62864-0927
Jersey	618-498-9576	618-498-7006	402 S. Jefferson St., PO Box 425	Jerseyville, IL 62052-0425
JoDaviess	815-858-2235	815-858-3728	212 N. Main St., PO Box 501	Elizabeth, IL 61028-0501
Johnson	618-658-2871	618-658-2540	PO Box 335, 809 N. First	Vienna, IL 62995-0335
Kane	630-584-8660	630-584-0023	2N710 Randall Rd.	St. Charles, IL 60174-1532
Kankakee	815-932-7471	815-932-6658	1605 W. Court	Kankakee, IL 60901-3216
Kendall	630-553-7403	630-553-7460	111 Van Emmon St., PO Box L	Yorkville, IL 60560-0258
Knox	309-342-2036	309-342-4136	180 S. Soangetaha Rd., PO Box 1427	Galesburg, IL 61402-1427
Lake	847-223-6506	847-223-6508	70 US Hwy 45	Grayslake, IL 60030-2200
LaSalle	815-433-0371	815-433-9327	4201 Columbus St.	Ottawa, IL 61350-9540

COUNTY	PHONE	FAX	STREET	CITY
Lawrence	618-943-2610	618-943-4233	1406 Locust St., PO Box 498	Lawrenceville, IL 62439-0498
Lee	815-857-3531	815-857-3532	37 S. East Ave., PO Box 198	Amboy, IL 61310-0198
Livingston	815-842-1103	815-842-1104	901 W. Howard St., PO Box 410	Pontiac, IL 61764-0410
Logan	217-732-7326	217-735-1599	120 S. McLean St., PO Box 128	Lincoln, IL 62656-0128
Macon	217-877-2436	217-877-0137	1150 W. Pershing Rd.	Decatur, IL 62526-6205
Macoupin	217-854-2571	217-854-6796	220 N. Broad St., PO Box 77	Carlinville, IL 62626-0077
Madison	618-656-5191	618-692-9103	900 Hillsboro Ave., PO Box 10	Edwardsville, IL 62025-0010
Mar.-Put.	309-364-2501	309-364-3658	509 Front St., PO Box 208	Henry, IL 61537-0208
Marion	618-548-2100	618-548-2360	Highway 37 North, PO Box 640	Salem, IL 62881-0640
Mason	309-543-4451	309-543-2486	127 S. High St., PO Box 318	Havana, IL 62644-0318
Massac	618-524-5811	618-524-3032	1436 W. 10th St., PO Box 908	Metropolis, IL 62960-0908
McDonough	309-837-3350	309-836-3212	210 S. Randolph, PO Box 249	Macomb, IL 61455-0249
McHenry	815-338-1520	815-338-1522	1102 McConnell Rd., PO Box 1530	Woodstock, IL 60098-1530
McLean	309-663-6497	309-662-8231	402 N. Hershey Rd.	Bloomington, IL 61704-3546
Menard	217-632-2217	217-632-5320	101 E. Jefferson, PO Box 258	Petersburg, IL 62675-0258
Mercer	309-582-5116	309-582-5473	206 SE Third, PO Box 40	Aledo, IL 61231-0040
Monroe	618-939-6197	618-939-6241	513 W. Park St., PO Box 129	Waterloo, IL 62298-0129
Montgomery	217-532-6171	217-532-6512	102 N. Main St.	Hillsboro, IL 62049-1148
Moultrie	217-728-4214	217-728-2533	1102 W. Jackson St.	Sullivan, IL 61951-1030
Ogle	815-732-2231	815-732-3412	421 W. Pines Rd., PO Box 195	Oregon, IL 61061-0195
Peoria	309-686-7070	309-686-8008	1716 N. University	Peoria, IL 61604-3901
Perry	618-357-9355	618-357-3217	309 S. First St., PO Box 287	Pinckneyville, IL 62274-0287
Piatt	217-762-2128	217-762-7014	427 W. Marion, PO Box 223	Monticello, IL 61856-0223
Pike	217-285-2233	217-285-2421	1301 E. Washington, PO Box 6	Pittsfield, IL 62363-0006
Pope-Har.	618-683-3651	618-683-3903	407 Main St., PO Box 418	Golconda, IL 62938-0418
Pul.-Alex.	618-745-9429	618-745-9511	404 S. Blanche, PO Box 310	Mounds, IL 62964-0310
Randolph	618-443-4511	618-443-5826	PO Box G, S. St. Louis at Belmont	Sparta, IL 62286-0907
Richland	618-393-4116		710 N. West, Rte. 130 N, PO Box 367	Olney, IL 62450-0367
Rock Island	309-736-7432	309-736-1450	1601 52nd Ave., Ste. 3	Moline, IL 61265-6389
Saline	618-252-6992	618-252-8431	21 W. Robinson St., PO Box 423	Harrisburg, IL 62946-0423
Sangamon	217-753-5200	217-753-5210	2449 N. Dirksen Pkwy.	Springfield, IL 62702-1404
Schuyler	217-322-4353		114 E. Lafayette St., PO Box 20	Rushville, IL 62681-0020
Scott	217-742-3351	217-742-3184	7 Market Side Sq., PO Box 50	Winchester, IL 62694-0050
Shelby	217-774-2151	217-774-5444	Rt. 128 North, PO Box 409	Shelbyville, IL 62565-0409
St. Clair	618-233-6800	618-235-2114	1478 E. State Route 15, Box 547	Belleville, IL 62222-0547
Stark	309-286-7481	309-286-7231	1001 E. Main St., PO Box 610	Toulon, IL 61483-0610
Stephenson	815-232-3186	815-232-0016	210 W. Spring St., PO Box 748	Freeport, IL 61032-0748
Tazewell	309-347-3165	309-347-6659	1505 Valle Vista Blvd.	Pekin, IL 61554-6245
Union	618-833-2125	618-833-8611	104 W. Broad St., PO Box F	Jonesboro, IL 62952-0476
Vermilion	217-442-8713	217-442-7364	431 N. Vermilion St.	Danville, IL 61832-4641
Wabash	618-262-5865	618-263-4111	524 W. 9th St., PO Box 159	Mt. Carmel, IL 62863-0159
Warr.-Hend.	309-734-9401	309-734-6097	1000 N. Main St., PO Box 350	Monmouth, IL 61462-0350
Washington	618-327-3081	618-327-8454	246 W. St. Louis St., PO Box 112	Nashville, IL 62263-1147
Wayne	618-842-3342	618-842-3636	301 E. Court St., PO Box 526	Fairfield, IL 62837-0526
White	618-382-8512	618-384-2535	304 E. Robinson St., P.O. Box 367	Carmi, IL 62821-0367
Whiteside	815-772-2165	815-772-4588	100 E. Knox St.	Morrison, IL 61270-2619
Will	815-727-4811	815-727-5570	100 Manhattan Rd.	Joliet, IL 60433-2757
Williamson	618-993-2609	618-997-9444	1517 E. DeYoung	Marion, IL 62959-5013
Winnebago	815-962-0653	815-962-0022	1925 S. Meridian Rd.	Rockford, IL 61102-2332
Woodford	309-467-2347	309-467-6034	117 W. Center St., Box 225	Eureka, IL 61530-0225

County Farm Bureau® Activities To Assist You And Your Classroom

Many of the county Farm Bureaus across the state have active Ag in the Classroom programs carried out by a number of volunteers and staff. By contacting your county Farm Bureau office—the phone number can be found on page 353 of this resource guide—you may find a variety of resources, materials, and programs which can be incorporated into your lesson plans. The following is a sample of activities that might be offered by your county Farm Bureau; not all counties offer the same programs.

Ag Careers - The county Farm Bureau may be able to assist you in obtaining local community leaders holding a job in an ag-related field. A panel discussion for your students will show them the wide variety of career choices found in agriculture.

Classroom Visits - Many county Farm Bureaus provide volunteers to visit your classroom and present lessons on a wide variety of ag-related topics, including conservation, beef, corn, careers, etc. Call and find out what your county offers.

Farm Tours - Opportunities may be available in your county to take your class to a farm to see modern agriculture firsthand. Please remember that September, October, April, and May can be extremely busy months for farmers since harvest and planting seasons fall in those months.

AITC Materials - Ag in the Classroom educational materials are available through the Farm Bureau organization. Contact your county Farm Bureau to see if they might provide materials to your classroom. County Farm Bureaus have access to Illinois Farm Bureau's video loan library; check your county office to find out what's available.

Teacher Workshops - Training sessions for you are sponsored by some of the county Farm Bureaus. Learn about what materials are available, activities to use in the classroom, and what assistance the Farm Bureau office can provide.

Agri-Science Kits - Ten self-contained kits have been developed by the Facilitating Coordination in Agricultural Education Staff for K-8 teachers. These kits may be at your county Farm Bureau office to borrow. Fun, hands-on activities will teach your students science and math principles through applied agricultural laboratory exercises.

"Ag Expo" - Your county Farm Bureau may work with other ag-related organizations and businesses to sponsor an activity for students to learn about various topics in agriculture. Classes can be bused to the designated site and ushered in small groups to each exhibit or activity to learn about grains, livestock, conservation, food processing, careers, and other ag topics.

National Agriculture Week - Check with your county Farm Bureau to see what activities are planned during National Ag Day, March 20, or Ag Week. Your classroom could help in celebrating the date with Farm Bureau.

Additional Assistance - If your county Farm Bureau is unable to assist you, contact the AITC Program Department, Illinois Farm Bureau®, 1701 N. Towanda Avenue, P.O. Box 2901, Bloomington IL 61702-2901, phone 309-557-3334 or visit our web site at www.agintheclassroom.org. The Illinois Farm Bureau® can put you in touch with your District AITC Coordinator.

Illinois Farm Bureau® Ag in the Classroom

Opportunities For Teachers

Grant Money Available

Every school year the Illinois Farm Bureau® Ag in the Classroom program, with support from the IAA Foundation, offers grants of up to $250 to K-8 teachers across the state of Illinois to fund projects promoting agricultural literacy in the classroom.

Applications are available every August at your county Farm Bureau. To apply for project funding, complete the application and return it to Ag in the Classroom, Illinois Farm Bureau®, 1701 N. Towanda Avenue, Bloomington, IL 61701. The deadline for applications each year is 4 p.m., on October 15. Faxed copies will not be accepted.

Applicants who are selected will be notified by the end of October.

Graduate Credit for K-8 Teachers

Each year Summer Ag Institutes, co-sponsored by Illinois Farm Bureau® and Illinois State University, Western Illinois University, the University of Illinois, Southern Illinois University, Northern Illinois University, Aurora University, and Parkland College/Earth Partners, are offered across the state for three graduate credits.

The course is designed for K-8 educators who wish to expand their curriculum to include topics related to agriculture—the world's food and fiber system. It focuses on the integration of available resources and hands-on activities about agriculture into existing classroom lessons.

Many county Farm Bureaus offer partial or full scholarships for teachers. If you would like information about the Summer Ag Institutes, please call 309-557-3334 or your county Farm Bureau.

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Ag in the Classroom
ILLINOIS FARM BUREAU®

THE IAA FOUNDATION

Kids, Crops, & Critters in the Classroom
Illinois Farm Bureau®
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Bloomington, IL 61702-2901
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